AD-751 900

LASER COMMUNICATION SYSTEMS

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AD-751 900

LASER COMMUNICATION SYSTEMS

A DDC BIBLIOGRAPHY

DDC-TAS-72-53

NOVEMBER 1972

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13 ABSTRACT

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Gas Lasers						
Injection Lasers						
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Irasers						
Semiconductors						
Chemical Lasers						
Propagation						
USSR						
Laser Diodes						
Semiconductor Lasers						
Space Communication Systems						

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AD-751 900

LASER COMMUNICATION SYSTEMS

A DDC BIBLIOGRAPHY

August 1961 - January 1972

DDC-TAS-72-53

NOVEMBER 1972

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DEFENSE SUPPLY AGENCY
CAMERON STATION
ALEXANDRIA, VIRGINIA 22314

F O R E W O R D

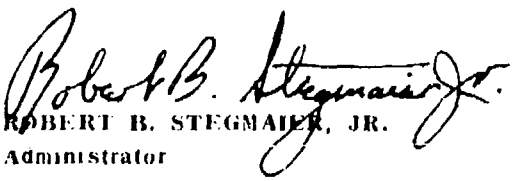
This bibliography is a selection of references to unclassified and unlimited reports in the Defense Documentation Center's collection on *Laser Communication Systems*. Entries were selected from references processed into the AD data bank from January 1953 through March 1972.

Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract, and Report Number indexes are included.

This bibliography supersedes Report Number DDC-TAS-70-56 dated August 1970, AD-710 460.

BY ORDER OF THE DIRECTOR, DEFENSE SUPPLY AGENCY

OFFICIAL



ROBERT B. STEGMAIER, JR.
Administrator
Defense Documentation Center

C O N T E N T S

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /7LW13

AD-264 455
STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

DIRECT OBSERVATION OF MICROWAVE-FREQUENCY BEATS DUE TO PHOTOMIXING OF RUBY-OPTICAL-MASER MODES (U)

1V MCMURTRY,B.J.;SIEGMAN,A.E.;

CONTRACT: DA36 039SC85387
MONITOR: AFOSR 1350

UNCLASSIFIED REPORT

DESCRIPTORS: *MASERS, *MICROWAVES, *PHOTOTUBES, *RUBY, DESIGN, LASERS, MEASUREMENT, OPTICAL EQUIPMENT, OXIDE CATHODES, RADIO RECEIVERS, TRAVELING WAVE TUBES (U)

OBSERVATIONS WERE MADE OF MICROWAVE SIGNALS PRODUCED BY PHOTOMIXING OF NEAR-NEIGHBOR AXIALMODE COMPONENTS IN THE OUTPUT SPECTRUM OF A RUBY OPTICAL MASER (LASER). THE OBSERVATIONS WERE MADE BY FOCUSING THE LASER OUT UT ONTO THE OXIDE CATHODE OF AN OPERATING 2500-4000 MC TRAVELINGWAVE TUBE. MIXING (HETERODYNING) BETWEEN THE SIMULTANEOUS, DISCRETE OPTICAL FREQUENCIES IN THE LASER OUTPUT OCCURS IN THE TWT CATHODE, PRODUCING MICROWAVE AMPLITUDE MODULATION OF THE BEAM CURRENT. THIS AMPLITUDE MODULATION IS AMPLIFIED IN THE HELIX SECTION, PRODUCING EASILY OBSERVABLE MICROWAVE SIGNALS IN THE TWT OUTPUT. WITHIN THE TWT BANDWIDTH, DISCRETE SIGNALS WERE OBSERVED AT 1800 PLUS OR MINUS 20, 2410 PLUS OR MINUS 3, 3000 PLUS OR MINUS 20, AND 3600 PLUS OR MINUS 20 MC, REPRESENTING THE 'PHOTO-BEATS' BETWEEN THIRD- THROUGH SIXTH-NEAREST NEIGHBORS IN THE LASER-MODE SPECTRUM. THIS METHOD OF OBSERVATION IS A POWERFUL TOOL FOR STUDY OF OPTICAL MASERS, AND ALSO HAS SIGNIFICANT IMPLICATIONS FOR COMMUNICATIONS EMPLOYING MICROWAVEMODULATED LIGHT. IT VERIFIES A NUMBER OF SUGGESTIONS FOR CONSTRUCTING MICROWAVE PHOTOTUBES OUTLINED BY THE AUTHORS AT A RECENT CONFERENCE. (PHYS. REV. 99:1691, 1955) (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-267 857
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS ANTENNA LAB

OCT 61 1V LONG,R.K.I
REPT. NO. 1083 11
CONTRACT: AF33 616 7081

UNCLASSIFIED REPORT

DESCRIPTORS: ABSORPTION, AMPLIFIERS, ATTENUATION, COMMUNICATION SYSTEMS, ELECTROMAGNETIC WAVES, ELECTRONICS LABORATORIES, INFRARED OPTICAL SYSTEMS, INFRARED RADIATION, LABORATORY EQUIPMENT, LASERS, LIGHT, MASERS, OPTICAL EQUIPMENT, OPTICAL FILTERS, PHYSICS LABORATORIES, PROPAGATION, RUBY, SIMULATION, SPECTROGRAPHIC ANALYSIS, TEST FACILITIES (U)

THE DEVELOPMENT OF OPTICAL MASERS HAS RAISED THE POSSIBILITY OF THEIR USE IN COMMUNICATION AND HIGH POWER TRANSMISSION SYSTEMS. AT THE OHIO STATE UNIVERSITY, A FACILITY WAS CONSTRUCTED TO MAKE MEASUREMENTS OF THE PROPAGATION EFFECTS ASSOCIATED WITH SUCH SYSTEMS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-275 591
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

OPTICAL COMMUNICATIONS: A BIBLIOGRAPHIC SURVEY OF POSSIBLE SPACE AND TERRESTRIAL APPLICATIONS OF THE LASER AND MASER (U)

MAR 62 1V GOLDMANN,JACK S.;
REPT. NO. SB 62 7
CONTRACT: AF04 647 787

UNCLASSIFIED REPORT

DESCRIPTORS: *BIBLIOGRAPHIES, *LIGHT COMMUNICATION SYSTEMS, COMMUNICATION THEORY, LASERS, MASERS, SPACE ENVIRONMENTAL CONDITIONS (U)

THIS ANNOTATED BIBLIOGRAPHY INCLUDES PUBLICATIONS RELEASED FROM 1959 THROUGH FEBRUARY 1962. THE SURVEY CONTAINS REFERENCES TO THE SOLID STATE AND GASEOUS AREAS OF INVESTIGATION WHICH HAVE BEEN MADE WITH REGARDS TO THE APPLICATION OF MASERS AND LASERS TO OPTICAL COMMUNICATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-284 321
TRW SPACE TECHNOLOGY LABS REDONDO BEACH CALIF

ON THE PRODUCTION OF AND SCATTER PROPAGATION FROM ARTIFICIAL IRREGULARITIES IN THE IONOSPHERIC D-LAYER(U)

JUN 62 1V GARDNER, JOHN H.;
REPT. NO. 62 532
CONTRACT: AF19 604 8844
MONITOR: AFCRL 62 532

UNCLASSIFIED REPORT

DESCRIPTORS: *IONOSPHERE, *LASERS, *LIGHT COMMUNICATION SYSTEMS, *MASERS, ANTENNA RADIATION PATTERNS, ANTENNAS, COMMUNICATION THEORY, DENSITY, ELECTRONS, INTEGRAL TRANSFORMS, LIGHT, REFRACTIVE INDEX, RELIABILITY, RUBY, SIGNALS, ULTRAHIGH FREQUENCY (U)

THE POSSIBILITY OF UTILIZING IRREGULARITIES PRODUCED IN THE IONOSPHERIC D-LAYER BY RF HEATING OR BY INTENSE OPTICAL RADIATION FROM LASERS TO ENHANCE FORWARD SCATTER PROPAGATION IS CONSIDERED. IT IS SHOWN THAT, ON THE ASSUMPTION THAT A REDUCTION OF ELECTRON DENSITY BY A FACTOR OF TWO CAN BE ACHIEVED AT 70 KM BY RF HEATING WITH A ONE MEGAWATT BEAM OF 1 DEGREE HALF-POWER WIDTH AS CALCULATED BY MOLMUD, FORWARD SCATTER PROPAGATION WITH REDUCTION IN POWER OF ABOUT 50 DB FROM LINE-OF-SIGHT PROPAGATION CAN BE ACHIEVED FOR A DISTURBED IONOSPHERE. IF LASERS ARE USED TO LAY OUT A DIFFRACTION GRATING IN THE D-LAYER, SIMILAR RESULTS MAY BE ACHIEVED WITH THE RECEIVED POWER PROPORTIONAL TO THE SQUARE OF THE NUMBER OF GRATING LINES AND WITH THE ADDITIONAL POSSIBILITY OF UTILIZING HIGH-ORDER SPECTRA OF THE GRATING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-286 062
ARMY RESEARCH OFFICE WASHINGTON D C

LASER PROGRESS AND APPLICATIONS (U)

DEC 62 1V MERRILL,HARRISON J.;

UNCLASSIFIED REPORT

DESCRIPTORS: *LASERS, CHROMIUM, COMMUNICATION SYSTEMS, GUIDANCE, ILLUMINATION, RANGE FINDING, RETINA, RUBY, SURGERY, THEORY, WELDING (U)

THE INTENSIVE LASER DEVELOPMENT IS BASED ON A CONSIDERATION OF SCHWALOW AND TOWNES WHO DETERMINED THAT OPTICAL STIMULATION COULD OCCUR WHEN THE DIFFERENCE IN ENERGY STATES EXCEEDED A CERTAIN MINIMUM VALUE. THE OUTPUT DEVELOPS THROUGH EMISSION AS THE POPULATION OF A HIGHER ENERGY STATE IS STIMULATED TO RETURN TO THE GROUND LEVEL. THE CONDITION OF OSCILLATION IS CONTROLLED BY REFLECTIVITY OF CAVITY ENDS, THE TEMPERATURE AND THE EFFECTIVE VOLUME. THE MODIFICATION OF THE Q BY CHANGES IN REFLECTIVITY DURING LASER STIMULATION PERMITS OPERATION IN A SINGLE PULSE HAVING A PEAK POWER MORE THAN 3 MEGAWATTS WITH HALF POWER TIME LESS THAN 50 NANO-SEC. THE PINK RUBY DOPED WITH .05% CHROMIUM HAS PROVED MOST USEFUL OPERATED AS THE THREE LEVEL LASER. IMPROVED EFFICIENCY AND QUALITY MAY BE ACHIEVED BY USE OF OTHER MATERIALS. THE LASER SOURCE IS UNIQUE OPTICALLY CHARACTERIZED BY ITS COHERENCE, MONOCHROMATICITY AND HIGH ENERGY DENSITY. IT MAY BE USEFUL IN RANGE FINDING, SPECIAL ILLUMINATION AND COMMUNICATION AND GUIDANCE CONTROL; AS A SOURCE FOR SPECIAL SCIENTIFIC INVESTIGATIONS; IT HAS ALREADY FOUND USES IN MICRO-WELDING AND FOR RESTORING DETACHED RETINAS IN THE EYE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-286 611
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

AN ASTRO-SHIP CALLS THE EARTH (SUPER-LONG DISTANCE COMMUNICATIONS WITH A SPACE SHIP) (U)

AUG 62 iv SOKOLOV,V.A.;IVANOV,YU. F.;
REPT. NO. TT 62 721

UNCLASSIFIED REPORT

DESCRIPTORS: *LIGHT COMMUNICATION SYSTEMS, *RADIO COMMUNICATION SYSTEMS, *SPACECRAFT, AIR-TO-SURFACE, LASERS, RUBY, SPACE COMMUNICATION SYSTEMS, SURFACE-TO-AIR, THEORY, TRANSLATIONS (U)
IDENTIFIERS: USSR (U)

SUPER LONG-DISTANCE COMMUNICATIONS WITH SPACESHIPS TRANSLATION USSR.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-286 641
ARMY RESEARCH OFFICE WASHINGTON D C

INVESTIGATIONS ON A BEAM WAVEGUIDE FOR OPTICAL FREQUENCIES (U)

DEC 62 1V GOURAU,G.;CHRISTIAN,J.R.;

UNCLASSIFIED REPORT

DESCRIPTORS: *LASERS, *LIGHT COMMUNICATION SYSTEMS, *WAVEGUIDES, DIELECTRICS, ELECTROMAGNETIC LENSES, LIGHT, LIGHT PULSES, MEASUREMENT, MICROWAVES, OPTICAL EQUIPMENT, WAVEGUIDE IRISES (U)

A BEAM WAVEGUIDE OF 970M LENGTH WAS CONSTRUCTED TO DETERMINE ITS APPLICABILITY TO THE TRANSMISSION OF COHERENT LIGHT.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-293 452
PHILCO CORP BLUE BELL PA

STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING OF OPTICAL COMMUNICATION SYSTEMS (U)

NOV 62 1V ANDERSON,R.F.;
REPT. NO. TDR62 733
CONTRACT: AF33 616 8392
MONITOR: ASD TDR62 733

UNCLASSIFIED REPORT

DESCRIPTORS: *LIGHT COMMUNICATION SYSTEMS, *LUNAR PROBES, *OPTICAL TRACKING, *SATELLITES (ARTIFICIAL), *SPACECRAFT, AIR-TO-AIR, AIRBORNE, ANALOG COMPUTERS, COMMUNICATION EQUIPMENT, COMMUNICATION SYSTEMS, COMMUNICATION THEORY, CONTROL SYSTEMS, ERRORS, IMAGE TUBES, INTERFERENCE, LASERS, MATHEMATICAL ANALYSIS, NUMERICAL ANALYSIS, ORBITAL TRAJECTORIES, PROBABILITY, SATELLITE ATTITUDE, SIGNAL-TO-NOISE RATIC, SOLAR RADIATION, SOLAR SYSTEMS, SPACE COMMUNICATION SYSTEMS, SPACE ENVIRONMENTAL CONDITIONS, STAR TRACKERS, STARS, SUN (U)

ACQUISITION AND TRACKING AS APPLIED TO REPRESENTATIVE OPTICAL COMMUNICATION SYSTEMS ARE STUDIED. THE TWO HYPOTHETICAL COMMUNICATION LINKS CONSIDERED WERE BETWEEN AN EARTH-ORBITING SATELLITE AND A MOON-ORBITING SATELLITE AND BETWEEN AN EARTH-ORBITING SATELLITE AND A CISLUNAR SPACE VEHICLE. THE RESULTS SHOW THAT ACQUISITION AND TRACKING ARE FEASIBLE. THE STUDY INCLUDES A TYPICAL SYSTEM DESIGN BASED ON THE USE OF A LASER COMMUNICATION TRANSMITTER. THIS SUBSYSTEM UTILIZES A FIVE-MOTOR GIMBAL CONFIGURATION WHICH MOUNTS THE OPTICAL SYSTEMS AND SENSORS THAT PERFORM THE FAR-BODY TRACKING FUNCTION AND THE ACQUISITION AND TRACKING OF THE COMMUNICATION BEAM. AN IMAGE TUBE IS USED AS THE ACQUISITION SENSOR IN ORDER TO OBTAIN HIGH SCANNING RATES. THE TRACKING SENSOR DESIGN IS BASED ON STATE-OF-THE-ART STAR TRACKER AND UTILIZES A MULTIPLIER PHOTOTUBE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-407 612
ILLINOIS UNIV URBANA

STUDY OF MODULATION AND DETECTING OF COHERENT OPTICAL RADIATION. (U)

DESCRIPTIVE NOTE: FINAL SUMMARY REPT.
FEB 63 2P HOLSHOUSER,D. F. ;
CONTRACT: AF-AFOSR-62-250
PROJ: AF-9767
TASK: 976702
MONITOR: AFOSR 4812

UNCLASSIFIED REPORT

DESCRIPTORS: *MICROWAVES, *MICROWAVE EQUIPMENT, LIQUIDS, DIELECTRICS, CARBON COMPOUNDS, SULFIDES, MICROWAVE FREQUENCY, DETECTION, OPTICAL INSTRUMENTS, MEASUREMENT, KERR CELLS, TEMPERATURE, LASERS, PHOTOMULTIPLIERS, NEODYMIUM, ELECTRON MULTIPLIERS, MODULATION, LIGHT. (U)
IDENTIFIERS: 1963. (U)

MICROWAVE-MODULATED LIGHT; FINAL SUMMARY REPT.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-410 571
OHIO STATE UNIV COLUMBUS

ABSORPTION OF LASER RADIATION IN THE ATMOSPHERE. (U)

MAY 63 150P LONG,RONALD K.;
REPT. NO. 1579-3, 3630-5237
CONTRACT: AF 33 657 10824
PROJ: 5237
TASK: 523704

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON STUDY OF MICROWAVE PROPAGATION.

DESCRIPTORS: (*LASERS, COMMUNICATIONS SYSTEMS), (*ATMOSPHERE, ABSORPTION), MICROWAVE SPECTROSCOPY, SOLAR SPECTRUM, DETECTION, MEASUREMENT, OZONE, NITROGEN COMPOUNDS, OXIDES, HELIUM GROUP GASES, RARE EARTH ELEMENTS, ATTENUATION, MODULATION, OPTICAL PROPERTIES, RUBY. (U)
IDENTIFIERS: METHANE, 1963. (U)

LASER RADIATION ABSORPTION IN THE ATMOSPHERE.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-420 983
AMERICAN OPTICAL CO SOUTHBRIDGE MASS

EXPERIMENTAL VERIFICATION OF SUN-POWERED LASER TRANSMITTER. (U)

DESCRIPTIVE NOTE: FINAL REPT., MAR 62-MAY 63,
AUG 63 110P SIMPSON,G. R. ;
CONTRACT: AF33 657 8619
PROJ: 4335
TASK: 433513
MONITOR: ASD TDR63 727

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, DESIGN), (*COMMUNICATION SYSTEMS, SUN), SOLAR RADIATION, THERMAL STRESSES, OPTICAL EQUIPMENT, CALCIUM COMPOUNDS, TUNGSTATES, IMPURITIES, NEODYMIUM, GLASS, RUBY, HEAT EXCHANGERS, COOLANT PUMPS, TENSILE PROPERTIES, OPTICAL TRACKING, FIBER OPTICS (U)
IDENTIFIERS: OPTICAL TRANSMITTERS, 1963 (U)

A PROGRAM OF DESIGN AND EXPERIMENTATION LEADING TO THE DELIVERY OF AN EXPERIMENTAL MODEL OF A SUN-POWERED LASER TRANSMITTER IS PRESENTED. ANALYTICAL WORK IS PRESENTED WHICH RESULTED IN THE CHOICE OF ND:CAWO4 AND ND:GLASS AS CANDIDATES FOR CW SUN-POWERED OPERATION. THE DESIGN AND FABRICATION OF THE TRANSMITTER MOUNT, PUMP OPTICS AND LASER CAVITIES IS DESCRIBED. COOLING TECHNIQUES DEVELOPED (PRIMARILY ORIENTED TOWARD CAWO4 ALTHOUGH GENERALLY APPLICABLE TO ANY SOLID LASER MATERIAL OPERATING AT ROOM TEMPERATURE) AND THE DESIGN OF THE COOLING SYSTEM ARE DETAILED. EXPERIMENTAL EVALUATION OF A NUMBER OF LASER CONFIGURATIONS OF THE MATERIALS DISCUSSED IS PRESENTED. APPENDICES ARE PROVIDED WHICH GIVE (1) DEFINITION AND MEASUREMENT OF LOSS COEFFICIENT ''S'', (2) THE DERIVATION OF THE FIGURE OF MERIT ''G'' FOR A 4-LEVEL SYSTEM BASED ON QUANTITIES B, THE GAIN COEFFICIENT FOR LIGHT IN A LASER AND ''S'', (3) THE DERIVATION OF THE GAIN COEFFICIENT BETH, (4) THE METHOD OF CALCULATION OF THE POWER OUTPUT OF A CW LASER OSCILLATOR, (5) THE METHOD USED IN OBTAINING THERMAL CONDUCTIVITY MEASUREMENTS AND (6) A DESCRIPTION OF THE ORIGINAL ROOM TEMPERATURE OPERATION OF GLASS LASERS. FINALLY, RECOMMENDATIONS ARE GIVEN FOR FUTURE INVESTIGATIONS OF SUN-POWERED LASER OPERATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-422 511
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

INFRARED AND VISIBLE LIGHT EMISSION FROM FORWARDBIASED P-N JUNCTIONS, (U)

43 10P REDIKER, R. H. ;

UNCLASSIFIED REPORT
REPRINT FROM SOLID/STATE/DESIGN, PP. 3-12, AUG 63.
(COPIES NOT SUPPLIED BY DDC)
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, ELECTROLUMINESCENCE), (*LASERS, SEMICONDUCTOR DEVICES), (*LIGHT COMMUNICATION SYSTEMS, TELEVISION EQUIPMENT), (*MASERS, SEMICONDUCTOR DEVICES), INJECTION, DIODES (SEMICONDUCTOR), TRANSISTORS, GALLIUM ALLOYS, ARSENIC ALLOYS, INDIUM ALLOYS, PHOSPHORUS ALLOYS, LIGHT TRANSMISSION, INFRARED RADIATION, SPECTRA (INFRARED), SPECTRA (VISIBLE AND ULTRAVIOLET), PHOTONS (U)
IDENTIFIERS: 1963, BEAM-OF-LIGHT TRANSISTOR (U)

EFFORTS WERE DIRECTED TOWARD SEMICONDUCTOR DIODE LIGHT SOURCES AND SEMICONDUCTOR DIODE OPTICAL MASERS (LASERS) WHICH ARE THE FIRST PRACTICAL DEVICES IN A NEW FIELD FOR SEMICONDUCTOR DEVICES THAT INVOLVES THE EFFICIENT CONVERSION OF ELECTRICAL ENERGY INTO INFRARED AND VISIBLE LIGHT. IN THE FIRST PART OF THIS PAPER GAAS DIODES WILL BE DESCRIBED WHICH PRODUCE INCOHERENT INFRARED RADIATION WITH HIGH EFFICIENCY AS ORIGINALLY ANNOUNCED BY KEYES AND QUIST. INCOHERENT RADIATION, RADIATION SUCH AS IS OBTAINED FROM LIGHT BULBS AND FROM SPARK GAP TRANSMITTERS, HAS MANY DISADVANTAGES AS COMPARED TO COHERENT RADIATION SUCH AS IS NOW USED IN RADIO AND RADAR. ON THE OTHER HAND, INCOHERENT RADIATION CAN BE USED IN MANY APPLICATIONS AND I WILL DESCRIBE BELOW AN EXPERIMENT IN WHICH AUDIO AND VIDEO SIGNALS HAVE BEEN TRANSMITTED 30 MILES ON A BEAM OF THE INCOHERENT INFRARED RADIATION EMITTED BY A GAAS DIODE. MASER DIODES WILL THEN BE DESCRIBED: GAAS DIODES AND INAS DIODES WHICH EMIT COHERENT INFRARED RADIATION, AND GAASXP1-X DIODES WHICH EMIT COHERENT VISIBLE RADIATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-425 126
ARMY ELECTRONICS LABS FORT MONMOUTH N J

DIRECT MODULATION OF A HE-NE GAS LASER, (U)

MAR 63 2P SCHIEL,E. J. ;BOLMARCICH,J. J. ;

UNCLASSIFIED REPORT
REPRINT FROM PROCEEDINGS OF THE IEEE, PP. 940-941, JUNE 63. (COPIES NOT SUPPLIED BY DDC)
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, GASE,), HELIUM, NEON, MODULATION, DISCHARGE TUBES, IMAGE TUBES, ELECTRODES (U)
IDENTIFIERS: 1963, PHOTODIODES (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-434 378
ITT COMMUNICATION SYSTEMS INC PARAMUS N J

APPLICABILITY OF LASER TECHNIQUES, (U)

MAR 64 80P LITCHMAN, W. S. :
REPT. NO. 64TR379
CONTRACT: AF19 628 3358
MONITOR: ESD TDR64 249

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, COMMUNICATION SYSTEMS), LIGHT TRANSMISSION, MODULATION, DETECTION, LIGHT COMMUNICATION SYSTEMS, SURFACE-TO-SURFACE, SURFACE-TO-SPACE, SPACE-TO-SPACE, SPACE-TO-SURFACE, DETECTORS, MAGNETO-OPTIC EFFECT, MODULATORS, INTERFEROMETERS, ELECTROOPTICAL PHOTOGRAPHY, PROPAGATION, MATERIALS, FREQUENCY, OPTICAL EQUIPMENT, OPTICAL EQUIPMENT COMPONENTS (U)
IDENTIFIERS: POCKET CELLS, DEMODULATION, FARADAY EFFECT, COTTON-MOUTON EFFECT, POCKEL'S EFFECT, 1964 (U)

LASER COMMUNICATION TECHNIQUES ARE PRESENTED THAT CAN BE INTEGRATED INTO THE AIRCOM SYSTEM TO SATISFY UNMET CURRENT AND ESTIMATED FUTURE AF REQUIREMENTS. THE ADVENT OF THE LASER HAS AROUSED GREAT INTEREST AMONG COMMUNICATION ENGINEERS BECAUSE IT AFFORDS USE OF A NEW SPECTRUM MILLIONS OF MEGACYCLES WIDE. ALTHOUGH THE LASER WILL HAVE A GREAT IMPACT IN CERTAIN AREAS OF COMMUNICATIONS TECHNOLOGY, ITS POTENTIAL IN ANY SPECIFIC AREA MUST BE CAREFULLY EVALUATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-462 245
REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL ALA

LASERS, (U)

APR 64 42P CARAS,GUS J. ;
REPT. NO. RSIC-195

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, BIBLIOGRAPHIES), (*BIBLIOGRAPHIES, LASERS), REVIEWS, RUBY, MEDICAL RESEARCH, DETECTION, COMMUNICATION SYSTEMS, GUIDANCE, MANUFACTURING METHODS, FIBER OPTICS, GALLIUM ALLOYS, INDIUM ALLOYS, SILICON ALLOYS, ARSENIDES, PHOSPHIDES, ANTIMONY ALLOYS, CRYOGENICS, PUMPING (ELECTRONICS), FREQUENCY (U)
IDENTIFIERS: OPTICAL PUMPING, FOUR-LEVEL LASERS, GAS LASERS, LIQUID LASERS, SEMICONDUCTOR LASERS, SOLID STATE LASERS (U)

THIS STATE-OF-THE-ART SURVEY CONSISTS OF TWO SECTIONS, A TECHNICAL SUMMARY AND A BIBLIOGRAPHY. ALTHOUGH THE BIBLIOGRAPHY, WHICH CONSISTS OF 125 REFERENCES AND COVERS THE PERIOD OF 1 JANUARY 1963 TO 31 DECEMBER 1963 DEALS MOSTLY WITH THE SUBJECT OF LASER PUMPING, THE SUMMARY REVIEWS OTHER TOPICS OF LASER TECHNOLOGY INCLUDING A DESCRIPTION OF THE VARIOUS TYPES OF LASERS AND THEIR POTENTIAL APPLICATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-466 031
DAYTON UNIV OHIO RESEARCH INST

ATMOSPHERIC PROPAGATION STUDIES AT OPTICAL, MILLIMETER, AND MICROWAVE FREQUENCIES. PART II. THE MECHANISM OF SCINTILLATION. (U)

DESCRIPTIVE NOTE: REPT. FOR 1 JAN 64-20 JAN 65,
MAR 65 20P TAYLOR,PAUL B. ;
CONTRACT: AF33 615 1265
PROJ: 4062
TASK: 02
MONITOR: AL TR-65-79-PT. 2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MICROWAVES, PROPAGATION), (*MILLIMETER WAVES, PROPAGATION), (*LASERS, PROPAGATION), LIGHT TRANSMISSION, RADIO TRANSMISSION, VISIBILITY, LIGHT, MEASUREMENT, ATMOSPHERIC MOTION, OPTICAL IMAGES, REFRACTION, IONOSPHERE, ANALYSIS (U)
IDENTIFIERS: SCINTILLATION (U)

THE SCINTILLATION OF RECEIVED SIGNALS PROPAGATED THROUGH SOME TEN MILES OF ATMOSPHERE ON NARROW BEAMS (ONE AT AN OPTICAL FREQUENCY, THE OTHER AT A MICROWAVE FREQUENCY) HAVE BEEN REPORTED IN PART I. THE PRESENT REPORT REVIEWS SEVERAL EXPLANATIONS WHICH MIGHT ACCOUNT FOR THE PHENOMENA. IT IS FOUND THAT THE SCINTILLATION OBSERVED IN THE MICROWAVE SIGNAL IS NOT OUT OF LINE WITH THE STATISTICAL THEORIES OF PROPAGATION THROUGH A RANDOMLY HOMOGENEOUS ATMOSPHERE WHICH HAVE BEEN PROPOSED BY OTHERS. HOWEVER, A PRECISE DESCRIPTION OF THE MECHANISM IS STILL WANTING. THE SCINTILLATION OBSERVED IN THE OPTICAL SIGNAL IS MORE VIOLENT THAN ANY PREVIOUSLY REPORTED, AND SHOWS CHARACTERISTICS AT VARIANCE WITH THE STATISTICAL THEORIES OF THE ATMOSPHERE PRESENTED IN THE LITERATURE--NAMELY, IN THE OCCURRENCE OF SHORT INTENSE BURSTS OF SIGNAL SUPERIMPOSED ON A LOW-LEVEL RANDOMLY FLUCTUATING BACKGROUND. SCINTILLATION IN ANALOGOUS PHENOMENA, ESPECIALLY THAT OF RADIO AND OPTICAL STARS, SHOWS INDICATIONS OF SIMILAR TRAITS. THE SEVERAL EXPLANATIONS WHICH HAVE BEEN PROPOSED ARE MUTUALLY AT VARIANCE, AND NONE STANDS UP WELL UNDER CRITICISM. FURTHER EXPERIMENT AND STUDY IS REQUIRED IF A TENABLE EXPLANATION IS TO BE ESTABLISHED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-476 149 20/5
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

LASER ARRAYS. (U)

DESCRIPTIVE NOTE: RESEARCH REPT.,
JUL 65 44P GIBSON,JAMES CLARK ;
REPT. NO. ERL-65-21
CONTRACT: AF-AFOSR-139-64, AF-AFOSR-139-65
PROJ: AF-4751
MONITOR: AFOSR 66-0402

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *ANTENNA ARRAYS), ANTENNA CONFIGURATIONS, ANTENNA RADIATION PATTERNS, SPACE COMMUNICATION SYSTEMS, POLARIZATION, MATHEMATICAL ANALYSIS (U)
IDENTIFIERS: LINEAR BROADSIDE ARRAYS, DOLPH-TCHEBYSCHEFF ARRAYS, UNEQUALLY SPACED ARRAYS, SINGLE RING ARRAYS (U)

THIS PAPER DEALS WITH THE APPLICATION OF VARIOUS TYPES OF ARRAY TECHNIQUES. THE LASER IS ASSUMED TO HAVE A GAUSSIAN FIELD DISTRIBUTION AT ITS APERTURE, AND ITS FAR FIELD PATTERN IS DEVELOPED FROM THIS APERTURE PATTERN. THE LINEAR BROADSIDE ARRAY FACTOR IS APPLIED TO BOTH THE GAUSSIAN ELEMENT PATTERN AND TO AN ELEMENT CONSISTING OF A CIRCULAR APERTURE UNIFORMLY ILLUMINATED WITH A PLANE WAVE. THE DOLPH-TCHEBYSCHEFF AND BINOMIAL AMPLITUDE DISTRIBUTION ARRAY FACTORS ARE APPLIED TO THE GAUSSIAN ELEMENT PATTERN TO REDUCE SIDELOBE LEVELS WITH EQUAL ELEMENT SPACING. ISHIMARU'S TECHNIQUE OF UNEQUAL ELEMENT SPACING IS APPLIED TO THE GAUSSIAN ELEMENT PATTERN TO REDUCE SIDELOBES, AND THEN TO SUPPRESS THE SECONDARY BEAM. THE HALF-POWER BEAMWIDTHS ARE CALCULATED AND COMPARED, AND THE CIRCULAR ARRAY IS INVESTIGATED FOR APPLICATION TO THE GAUSSIAN ELEMENT PATTERN. RESULTS CONCERNING RELATIVE SIDELOBE LEVELS AND GRATING LOBE LEVELS ARE TABULATED AND COMPARED. CONCLUSIONS ARE MADE CONCERNING THE FEASIBILITY OF APPLYING ARRAY THEORY TO LASERS WITH ELEMENT SPACINGS OF HUNDREDS OF WAVELENGTHS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-601 660
ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y

IN-CAVITY LASER MODULATION STUDY, (U)

MAY 64 25P RUGARIL ,ANTHONY D. ;
PROJ: DS63 9
MONITOR: RADC TDR64 129

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, MODULATION), ELECTRON OPTICS, MIRRORS, PRISMS (OPTICS), CRYSTALS, POTASSIUM COMPOUNDS, PHOSPHATES, QUARTZ, REFRACTIVE INDEX, LIGHT TRANSMISSION, OSCILLATION, DISPLAY SYSTEMS (U)

THEORETICAL AND EXPERIMENTAL STUDY WAS PERFORMED TO INVESTIGATE A LASER MODULATION TECHNIQUE CAPABLE OF PROVIDING A FLAT FREQUENCY RESPONSE OVER THE RANGE OF 30 CPS TO 30 MC/S WITH A MODULATION INDEX OF 0.5 OR GREATER. THE TECHNIQUE INVOLVED THE INTRODUCTION OF CONTROLLABLE LOSSES TO THE LASER CAVITY BY ALTERNATE ALIGNMENT AND MISALIGNMENT OF THE CAVITY REFLECTORS. THIS WAS TO BE ACCOMPLISHED BY INSERTION OF AN ELECTRO-OPTIC PRISM IN THE CAVITY AND VARYING THE ANGLE OF DEVIATION OF THE EXIT BEAM FROM THE PRISM BY ELECTRICALLY CONTROLLING THE MAGNITUDE OF THE INDEX OF REFRACTION OF THE PRISM. THE TRANSMISSION LOSSES ASSOCIATED WITH THE ELECTROOPTIC PRISM WERE EXPERIMENTALLY FOUND TO BE GREATER THAN THE GAIN OF THE LASER CAVITY. THUS, OSCILLATIONS COULD NOT BE MAINTAINED WITH THE ELECTRO-OPTIC PRISM IN THE CAVITY. THE MAJOR FACTORS CONTRIBUTING TO THE TRANSMISSION LOSSES WERE FOUND TO BE REFLECTION LOSSES AND AN INHERENT BIREFRINGENCE OF THE CRYSTALLINE MATERIALS. PERTINENT THEORETICAL DISCUSSIONS AND EXPERIMENTAL RESULTS ARE INCLUDED IN THE REPORT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-603 004
BAIRD ATOMIC INC CAMBRIDGE MASS

EFFECT OF OPTICAL PATH IMPERFECTIONS ON FABRY-PEROT MODULATOR PERFORMANCE. (U)

DESCRIPTIVE NOTE: RFPT. FOR 17 FEB-17 JUL 64,
64 78P DELPIANO,VINCENT ,JR.;
CONTRACT: AF 33(615)-1254
PROJ: AF-4335
TASK: 433513
MONITOR: AFAL TDR-64-141

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MODULATORS, PERFORMANCE (ENGINEERING)), LASERS, LIGHT TRANSMISSION, REFRACTION, BROADBAND, AMPLIFIERS, FREQUENCY, PROBABILITY, INTERFEROMETERS, PIEZOELECTRIC CRYSTALS, SURFACE PROPERTIES, POTASSIUM COMPOUNDS, PHOSPHATES (U)
IDENTIFIERS: FABRY-PEROT MODULATOR, ELECTRO-OPTIC EFFECT, POTASSIUM DIHYDROPHOSPHATE (U)

UNDER A PREVIOUS CONTRACT, A THEORETICAL INVESTIGATION WAS CONDUCTED ON THE EFFECTS OF VARIATION IN OPTICAL PATHLENGTH UPON THE PERFORMANCE OF A FABRY-PEROT TYPE WIDEBAND MODULATOR. THE VARIATIONS CONSISTED OF STATISTICAL DISTRIBUTIONS WITHIN OR ACROSS THE APERTURE, AND TWO PROBABILITY DISTRIBUTIONS OF THE VARIABLE PATHLENGTH WERE STUDIED: A RECTANGULAR AND A GAUSSIAN. THE OBJECTIVE OF THE PRESENT WORK WAS TO PROVIDE DIRECT EXPERIMENTAL VERIFICATION OF THE THEORETICAL RESULTS OF THE PROBABILITY STUDY AS WELL AS TO CHARACTERIZE AND ACCESS THE PRESENT PERFORMANCE OF THE MODULATOR IN ORDER TO PROVIDE GUIDANCE FOR FUTURE WORK. IT IS SHOWN THAT THE PLANE-PARALLEL FABRY-PEROT TYPE OF MODULATOR WILL APPROACH IDEAL THEORETICAL PERFORMANCE ONLY FOR EXTREMELY SMALL APERTURES OF THE ORDER OF 0.045 INCH OR LESS AND THAT THIS RESULT IS IN ACCORDANCE WITH THE THEORETICALLY PREDICTED PERFORMANCE. IT IS FURTHER SHOWN THAT THE MODULATOR PERFORMANCE DEPENDS CRITICALLY UPON THE FREQUENCY STABILITY AND BANDWIDTH OF THE SOURCE AND THAT FREQUENCY DRIFTS, F SUB 0, GREATER THAN A FEW MEGACYCLES WILL CAUSE LARGE FLUCTUATIONS IN THE AVERAGE TRANSMISSION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-603 622
CONTROL DATA CORP MELVILLE N Y TRG DIV

HETERODYNE DETECTION IN OPTICAL COMMUNICATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUL 64 307P JACOBS,S. F. ;LATOURRETTE,
J. T. ;GOULD,G. ;RABINOWITZ,P. ;
CONTRACT: AF30 602 2591
PROJ: 4519
TASK: 451905
MONITOR: RADC , TDR64 130

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, MODULATION), (*MODULATION, LIGHT COMMUNICATION SYSTEMS), LASERS, INTERFEROMETERS, MIXERS (ELECTRONIC), SIGNAL-TO-NOISE RATIO, NOISE (RADIO), LIGHT TRANSMISSION, REFLECTORS, BROADBAND, AMPLIFIERS, OPTICS, MEASUREMENT, THEORY, EQUATIONS (U)
IDENTIFIERS: HETERODYNE (U)

THE PROPERTIES OF OPTICAL HETERODYNE DETECTION ARE ANALYZED AND MEASURED, USING A LASER AND TWYMAN-GREEN INTERFEROMETER. IT IS SHOWN THAT HETERODYNE AMPLIFICATION PRESERVES THE SIGNAL-TO-NOISE RATIO IN THE DETECTED DIFFERENCE FREQUENCY IN THE PRESENCE OF INCOHERENT NOISE AND THAT THE LIMITING NOISE OF THE SYSTEM IS PHOTOCURRENT SHOT NOISE. SUITABILITY OF THIS TECHNIQUE IS DEMONSTRATED FOR DIFFUSE AS WELL AS SPECULAR MIRRORS AND CORNER REFLECTORS AS WELL AS FLATS. VARIOUS TECHNIQUES OF MODULATION ARE DISCUSSED AND DEMONSTRATED, INCLUDING PHASE, AMPLITUDE AND SINGLE-SIDEBAND MODULATION. A METHOD IS DEVELOPED FOR THE DEMODULATION OF PHASE-MODULATED LIGHT. THE LIMITATIONS IMPOSED ON THE OPTICAL HETERODYNE TECHNIQUE BY THE TRANSMISSION PATH CONDITIONS ARE INVESTIGATED. SINGLE-SIDEBAND VS DOUBLE-DETECTION TECHNIQUES ARE COMPARED EXPERIMENTALLY, UNDER TURBULENT ATMOSPHERIC CONDITIONS. THE FORMER PROVES TO BE THE SUPERIOR TECHNIQUE. DESIGN AND CONSTRUCTION OF A FIELD INSTRUMENT EMBODYING THIS PRINCIPLE IS INITIATED. THE USES AND LIMITATIONS OF HETERODYNE DETECTION IN OPTICAL COMMUNICATIONS, DEMULTIPLEXING OF CHANNELS, DEMODULATION OF FM AND AM, DOPPLER AND DISPLACEMENT MEASUREMENTS, AND LASER STABILIZATION ARE DISCUSSED. RECOMMENDATIONS ARE MADE FOR FUTURE RESEARCH AND DEVELOPMENT. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-604 735
BEGE (J R M) CO ARLINGTON MASS

LASER BEAM ATTENUATION IN THE LOWER ATMOSPHERE, (U)

NOV 63 86P LANGER,R. M. ;
REPT. NO. 6331
CONTRACT: NOBS88609

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, ELECTROMAGNETIC WAVES), (*ELECTROMAGNETIC WAVES, ATTENUATION), (*ATMOSPHERE, LIGHT TRANSMISSION), WAVE TRANSMISSION, CLOUDS, REFRACTIVE INDEX, AEROSOLS, SCATTERING, ABSORPTION, OPTICS (U)

SMALL ANGLE SPREADING, AEROSOL SCATTERING AND MOLECULAR ABSORPTION ARE CONSIDERED THE IMPORTANT MECHANISMS FOR THE WEAKENING OF A LASER BEAM IN THE OPEN ATMOSPHERE. THREE DIFFERENT TRANSMISSION LAWS ARE WORKED OUT FOR THESE THREE MECHANISMS. BOTH THE PHYSICAL PRINCIPLES AND THE NUMERICAL VALUES ENCOUNTERED IN THE LOWER ATMOSPHERE ARE DISCUSSED AND ILLUSTRATED. RANDOM DENSITY FLUCTUATIONS IN THE TURBULENT ATMOSPHERE ARE DISCUSSED AS THE CAUSE OF SMALL ANGULAR DEFLECTIONS IN A NARROW PENCIL OF LIGHT. BEAM ATTENUATION DUE TO ATMOSPHERIC AEROSOL SCATTERING IS TREATED FOR AN AEROSOL SIZE DISTRIBUTION DESCRIBED BY THE SUM OF TWO INVERSE POWERS OF THE DROPLET RADIUS. LASER BEAMS CAN HELP FIND THE PARAMETERS OF SUCH DISTRIBUTIONS. MOLECULAR ABSORPTION IS EXAMINED IN TERMS OF THE NARROW INFRARED LINES OF WATER VAPOUR. AN EFFORT IS MADE TO PRESENT THIS DIFFICULT TOPIC IN AS SIMPLE AND USEFUL A FORM AS IS COMPATIBLE WITH THE OBSERVATIONAL MATERIAL. THE FORMULAE ARE DESIGNED TO MAKE IT POSSIBLE TO ESTIMATE IN DETAIL HOW THE ATMOSPHERE WOULD WEAKEN A LASER BEAM UNDER A WIDE VARIETY OF CONDITIONS. IT IS FOUND THAT SOME EFFECTS ARE SERIOUS EVEN AT SHORT RANGES OF A FEW METERS, WHILE IN FAVOURABLE CIRCUMSTANCES, LASER SIGNALS WOULD NOT BE DRASTICALLY ATTENUATED OUT TO ANY PRACTICAL DISTANCE IN THE LOWER ATMOSPHERE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-605 319
TECHNICAL OPERATIONS INC BURLINGTON MASS

INVESTIGATION OF COHERENT OPTICAL PROPAGATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.
AUG 64 64P SKINNER,T. J. ;WHITNEY,R. E.
;
CONTRACT: AF30 602 2619
PROJ: 4519
TASK: 451905
MONITOR: RADC , TDR64 65

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, LIGHT TRANSMISSION), (*LIGHT SIGNALS, PROPAGATION), (*LIGHT COMMUNICATION SYSTEMS, LASERS), WAVEGUIDES, OPTICAL EQUIPMENT COMPONENTS, WAVEGUIDE BENDS, ALIGNMENT, FLEXIBLE COUPLINGS, PRISMS (OPTICS) (U)

THE REPORT DISCUSSES THE GUIDED PROPAGATION OF AN OPTICAL SIGNAL. THE BEAM-WAVEGUIDE WAS CHOSEN FOR CONSIDERATION BECAUSE OF ITS EXTREMELY LOW INTRINSIC LOSS. THESE INTRINSIC LOSSES, ALONG WITH MISALIGNMENT AND FEED LOSSES, ARE DERIVED. THE MISALIGNMENT LOSSES ARE HIGH. TO REDUCE THEM, A FLEXIBLE JOINT WAS DESIGNED THAT ALLOWS THE GUIDE TO FLEX WITHOUT INTRODUCING PROHIBITIVE LOSSES. ALTHOUGH MUCH WORK REMAINS TO BE DONE BEFORE A PRACTICAL OPTICAL WAVEGUIDE FOR LONG PATHS EXISTS, THE REPORT DEMONSTRATES THE FEASIBILITY OF THE BEAM-WAVEGUIDE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-605 466
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

GAS AND LIQUID LASERS, (U)

AUG 64 8P TSENG,CHAO-SHOU ;
REPT. NO. FTD-TT-64-565

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF K'O HSUEH TA CHUNG (CHINESE PEOPLE'S REPUBLIC) 1963, NO. 11, P. 22-23.

DESCRIPTORS: (*LASERS, REVIEWS), GASES, LIQUIDS, LIGHT COMMUNICATION SYSTEMS, CHINA (U)

A POPULARIZED REVIEW OF THE BASIC PRINCIPLES OF GAS AND LIQUID LASERS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-605 478
SYLVANIA ELECTRONIC SYSTEMS-WEST MOUNTAIN VIEW CALIF
ELECTRONIC DEFENSE LABS

RESEARCH OF TECHNIQUES FOR LIGHT MODULATION DETECTION. PART I. AMPLITUDE DEMODULATORS. (U)

DESCRIPTIVE NOTE: FINAL REPT. (PART 1), 15 MAY 62-15 MAY 63,
JUN 64 136P MCMURTRY ,B. J. ;CADDES , D. F. ;TARG ,R. ;SIEGMAN,A. E. ;
CONTRACT: AF33 657 8995
PROJ: AF-4156
TASK: 415610
MONITOR: AFAL TDR-64-181-PT-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ALSO SEE AD-410 264

DESCRIPTORS: (*LIGHT, DEMODULATION), (*AMPLITUDE MODULATION, LIGHT), (*PHOTOTUBES, MICROWAVE EQUIPMENT), LIGHT COMMUNICATION SYSTEMS, TRAVELING WAVE TUBES, LASERS, BROADBAND, MICROWAVE FREQUENCY, PHOTOMULTIPLIERS, ELECTRON GUNS, LIGHT TRANSMISSION, VELOCITY, DEMODULATORS, NOISE (RADIO), ELECTRON DENSITY, PHOTOCATHODES, DESIGN, CONSTRUCTION, TESTS (U)
IDENTIFIERS: TRAVELING-WAVE MICROWAVE PHOTOTUBES (U)

THE RESULTS OF A ONE-YEAR APPLIED RESEARCH PROGRAM ON THE DEMODULATION OF AMPLITUDE-MODULATED (AM) LIGHT ARE PRESENTED. SUFFICIENT INFORMATION IS PROVIDED FOR THE DETAILED UNDERSTANDING, DESIGN, AND USE OF TRAVELING-WAVE MICROWAVE PHOTOTUBES (TWPS), THE MOST PROMISING DETECTOR FOR BROADBAND-MODULATED LIGHT. THE REPORT INCLUDES: (1) THE IDEALIZED ANALYSIS WHICH FIRST POINTED OUT THE MORE IMPORTANT TWP DESIGN CONSIDERATIONS AND OPERATING CHARACTERISTICS; (2) A MORE COMPLETE COMPUTERAIDED ANALYSIS WHICH GIVES DETAILED INFORMATION ON THE EFFECTS OF THE VARIOUS BEAM-CIRCUIT PARAMETERS AND OPERATING CONDITIONS; AND (3) AN ANALYSIS OF THE ELECTRON GUN REGION, WITH EMPHASIS ON VELOCITY SPREAD AND CURRENT DENSITY EFFECTS. THE RESULTS OF A DETAILED EXPERIMENTAL ANALYSIS OF THE TWP ARE PRESENTED, PROVIDING BOTH VERIFICATION OF THE MORE COMPLETE THEORETICAL TREATMENT AND INFORMATION ON GENERALLY-USEFUL PHOTODETECTOR TEST TECHNIQUES. EXPERIMENTAL DATA ARE GIVEN ON SEVERAL OTHER TYPES OF PHOTODETECTORS.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-605 512
SYLVANIA ELECTRONIC SYSTEMS-WEST MOUNTAIN VIEW CALIF
ELECTRONIC DEFENSE LABS

RESEARCH ON TECHNIQUES FOR LIGHT MODULATION DETECTION; PART II: FREQUENCY DEMODULATORS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 15 MAY 63-15 MAY 64, JUN 64 256P AMMANN,E. O. ;HARRIS,S. E. ; TARG,R. ;
CONTRACT: AF 33(657)-8995, AF 04(695)-305
PROJ: AF-4156
TASK: 415610
MONITOR: AFAL TDR-64-181-P2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: STUDY MADE IN COOPERATION WITH STANFORD UNIV. UNDER CONTRACT TO AIR FORCE SYSTEMS COMMAND. SEE ALSO AD-605 478.

DESCRIPTORS: (*LIGHT, DEMODULATION), (*FREQUENCY MODULATION, LIGHT), (*PHASE MODULATION, LIGHT), (*PHOTOTUBES, MICROWAVE EQUIPMENT), LIGHT COMMUNICATION SYSTEMS, REFRACTION, DISCRIMINATORS, MICROWAVE FREQUENCY, DEMODULATORS, CRYSTALS, NOISE (RADIO), SIGNAL-TO-NOISE RATIO, LASERS, BROADBAND, DESIGN, CONSTRUCTION, TESTS (U)
IDENTIFIERS: BIREFRINGENT DISCRIMINATORS, OPTICAL RATIO DETECTORS, HETERODYNE DETECTION (U)

THE RESULTS OF A ONE-YEAR PROGRAM ON THE DEMODULATION OF FREQUENCY-MODULATED (FM) OR PHASE-MODULATED (PM) LIGHT ARE PRESENTED. THEORETICAL AND EXPERIMENTAL STUDIES WERE MADE BOTH OF DIRECT DEMODULATION AND HETERODYNE DEMODULATION. A TECHNIQUE EMPLOYING CONVERSION OF FM TO AM VIA A BIREFRINGENT DEVICE WITH SUBSEQUENT DETECTION BY A TRAVELING-WAVE PHOTOTUBE IS USED FOR THE DEMODULATION METHOD. THE REPORT DEALS WITH TECHNIQUES AND DEVICES FOR CONVERTING FM (AND PM) TO AM AT OPTICAL FREQUENCIES. COMPREHENSIVE ANALYSES AND DISCUSSIONS ARE GIVEN ON TWO SIMPLE BIREFRINGENT DEVICES, THE BIREFRINGENT DISCRIMINATOR AND THE OPTICAL RATIO DETECTOR, DEVICES CAPABLE OF CONVERTING FM TO AM AND PM TO AM, RESPECTIVELY. THE USE OF MULTICRYSTAL DEVICES IN DEMODULATORS IS TREATED. INCLUDED ARE TWO OPTICAL NETWORK SYNTHESIS TECHNIQUES FOR REALIZING BIREFRINGENT DEVICES HAVING ARBITRARILY SPECIFIED TRANSFER FUNCTIONS.

25 (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-605 940
UNITED AIRCRAFT CORP EAST HARTFORD CONN

ULTRASONIC CONTROL OF LASER PERFORMANCE. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 26 JUN 63-25 JUN 64,

SEP 64 64P DEMARIA,A. J. ;DANIELSON,G. E. ,JR.;
REPT. NO. UNAIR-C-920083-12
CONTRACT: DA19 020AMC0170A
PROJ: IG6 22001A056 03 17

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MODULATION, LASERS), (*LASERS, CONTROL), (*ULTRASONIC RADIATION, LASERS), GLASS, IMPURITIES, NEODYMIUM, REFRACTIVE INDEX, MECHANICAL WAVES, FEEDBACK, TUNNELING (ELECTRONICS), STANDING WAVE RATIOS, PERFORMANCE (ENGINEERING) (U)

THE REPORT DESCRIBES THE WORK PERFORMED ON A RESEARCH PROGRAM DIRECTED TOWARD DETERMINING THE OSCILLATION CHARACTERISTICS OF A LASER WHEN THE REFRACTIVE INDEX WITHIN THE FEEDBACK CAVITY IS PERTURBED BY MEANS OF ACOUSTIC, ELECTRIC, OR MAGNETIC FIELDS. THE LASER IS REPRESENTED IN TERMS OF A SYSTEM BLOCK DIAGRAM HAVING FORWARD AND FEEDBACK TRANSFER FUNCTIONS WHICH CAN BE VARIED IN A PERIODIC MANNER SO AS TO MODULATE THE OUTPUT OF THE QUANTUM DEVICE. THE MODIFICATION OF A LASER'S FEEDBACK TRANSFER FUNCTION BY AN ULTRASONIC-REFRACTION AND BY AN OPTICAL-TUNNELING SHUTTER HAS BEEN UTILIZED TO GATE THE LASER'S OUTPUT. EXPERIMENTS ARE REPORTED WHICH DEMONSTRATE THAT THE PERIODIC FLUCTUATION OF THE REFRACTIVE INDEX RESULTING FROM THE PROPAGATION OF FOCUSED ULTRASONIC ENERGY WITHIN A SOLID STATE LASER MEDIUM CAN BE UTILIZED AS A Q-SPOILER TO GATE THE OUTPUT OF HIGH GAIN LASERS WITHOUT THE INTRODUCTION OF LOSSY ELEMENTS INTO THE LASER'S FEEDBACK PATH. IN ADDITION, EXPERIMENTS ARE REPORTED WHICH REVEAL AN INCREASE IN THE ENERGY OUTPUT OF A NEODYMIUM DOPED LANTHANUM THORIUM BORATE GLASS ROD WHEN LONGITUDINAL ACOUSTICAL STANDING WAVES WERE PROPAGATED DOWN THE LENGTH OF THE GLASS ROD. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-606 219
STANFORD UNIV CALIF MICROWAVE LAB

PHOTOMIXING IN A BULK SEMICONDUCTOR PHOTODETECTOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 64 75P WEAVER,J. N. ;
REPT. NO. ML-1206
CONTRACT: NONR-225(48), NSF-G-22929
PROJ: NR373 361

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPPORTED IN PART BY THE U. S. ARMY SIGNAL CORPS AND U. S. AIR FORCE.

DESCRIPTORS: (*LIGHT, DEMODULATION), (*DEMODULATORS, LIGHT), (*SEMICONDUCTOR DEVICES, CRYSTAL MIXERS), (*PHOTOELECTRIC CELLS (SEMICONDUCTOR), PHOTOCONDUCTIVITY), SINGLE CRYSTALS, LASERS, MICROWAVE FREQUENCY, PHOTOELECTRIC EFFECT, ELECTRICAL PROPERTIES, VOLTAGE, ELECTRIC CURRENTS, THEORY, MATHEMATICAL ANALYSIS, EXPERIMENTAL DATA, DESIGN, CADMIUM ALLOYS, SELENIUM ALLOYS, SILICON, GALLIUM ALLOYS, ARSENIC ALLOYS (U)
IDENTIFIERS: SEMICONDUCTOR PHOTODETECTORS (U)

THIS STUDY IS CONCERNED WITH BULK SEMICONDUCTORS AS DETECTORS OF THE DIFFERENCE FREQUENCY BETWEEN TWO OR MORE OPTICAL SIGNALS AND AS A DEMODULATOR OF MICROWAVE AM MODULATED LIGHT. THE BASIC EXPERIMENT CONSISTED OF MOUNTING SINGLE CRYSTALS OF CDSE, SI, AND GAAS IN A COAXIAL MOUNT AND ILLUMINATING THE CRYSTALS WITH THE BEAM OF SINGLE LASER. A DC BIAS VOLTAGE WAS APPLIED AND THE MICROWAVE AND DC PHOTOCURRENTS WERE MEASURED AS A FUNCTION OF LIGHT INTENSITY, BIAS VOLTAGE, TEMPERATURE, MICROWAVE MATCH, AND THE VARIOUS CRYSTAL SAMPLES. SOME OF THE EXPERIMENTAL PROBLEMS ENCOUNTERED ARE DISCUSSED. AN OUTLINE OF THE PERTINENT, SIMPLIFIED PHOTOCONDUCTOR THEORY IS PRESENTED ALONG WITH AN EQUIVALENT CIRCUIT FOR THE PHOTODETECTOR DEVICE. ALSO, THE SEMICONDUCTOR CAPTURE CROSS SECTION, LIFETIME, AND TRAP DENSITY IS CALCULATED FROM THE MEASURED VALUES OF PHOTOCURRENT. THE BULK SEMICONDUCTOR PHOTODETECTOR IS SHOWN TO BE A RUGGED, SIMPLE, AND INEXPENSIVE DEVICE FOR DETECTING OPTICAL BEAT FREQUENCIES, PARTICULARLY AT HIGH LIGHT LEVELS AND IN THE INFRARED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-607 487
NAVAL RESEARCH LAB WASHINGTON D C

EXPERIMENTAL OBSERVATIONS OF FORWARD SCATTERING OF LIGHT IN THE LOWER ATMOSPHERE. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
SEP 64 50P CURCIO,J. A. ;DRUMMETER,L. F.
,JR.;
REPT. NO. NRL-6152
PROJ: RR004 02 42 5152

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT TRANSMISSION, SCATTERING), (*ATMOSPHERE, LIGHT TRANSMISSION), (*LIGHT, PROPAGATION), AEROSOLS, COMMUNICATION SYSTEMS, LASERS, AIR POLLUTION, RUBY (U)

THE REPORT DEALS IN PART WITH THE EXPERIMENTAL RESULTS FROM SEVEN MEASUREMENTS ON THE FORWARD SCATTERING OF LIGHT BY THE ATMOSPHERIC AEROSOL. IN ADDITION, CONSIDERATIONS OF THE PROBLEM OF DETECTING FORWARD SCATTERED LIGHT IN THE DAYTIME SHOW THAT ESTIMATED RESULTS AGREE WITH THE AVAILABLE EXPERIMENTAL DATA. CONSIDERATIONS OF THE FEASIBILITY OF USING OVER-THE-HORIZON PROPAGATION AS A COMMUNICATIONS LINK LEADS TO THE ESTIMATION THAT COMMUNICATION BETWEEN FIXED POINTS AT MORSE CODE RATES IS CURRENTLY FEASIBLE OVER RANGES OF THE ORDER OF 50 KM IN THE DAYTIME FOR METEOROLOGICAL RANGES OF 16 KM OR MORE, USING A NARROW-BEAM PROJECTOR AS SOURCE. SHIP-TO-SHIP COMMUNICATION WOULD REQUIRE SOURCES OF VERY HIGH POWER OR PRECISE STABILIZATION AND POINTING OF EXISTING HIGH-INTENSITY SEARCHLIGHT SOURCES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-607 852
STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

TUNING OF CW LASERS OVER ANGSTROM BANDWIDTHS: SOME POSSIBLE APPROACHES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. FOR JUN 63-JUN 64,
AUG 64 62P MORRIS,R. J. ;
REPT. NO. SEL-64-092 ,SEL-TR-0576-6
CONTRACT: AF 33(657)-11144
PROJ: AF-4036
TASK: 403602
MONITOR: AFAL TDR-64-227

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, TUNED AMPLIFIERS), (*TUNED AMPLIFIERS, LASERS), TUNING DEVICES, SIGNALS, FREQUENCY SHIFT, DIFFRACTION, SOUND, CRYSTALS, MAGNETIC FIELDS, DOPPLER EFFECT, TEMPERATURE, PARTICLE BEAMS, FREQUENCY MODULATION, MICROWAVE FREQUENCY (U)

THIS REPORT IS AN INVESTIGATION OF SEVERAL APPROACHES TO THE PROBLEM OF OBTAINING CW COHERENT OPTICAL SIGNALS WHOSE WAVELENGTH CAN BE SCANNED IN A CONTROLLED FASHION OVER A RANGE OF APPROXIMATELY 1 A OR MORE. THE METHODS DISCUSSED INCLUDE THE FOLLOWING INTERNAL TUNING METHODS: ZEEMAN TUNING; DIFFRACTION FROM ACOUSTIC WAVES; CRYSTALSTRAIN TUNING; THERMAL TUNING; TUNABLE MODE SELECTION IN WIDE LINES; AND DOPPLER-SHIFT TUNING USING A BEAM OF ACCELERATED PARTICLES. THE LAST METHOD LISTED IS BELIEVED TO BE A NOVEL SCHEME FOR LASER TUNING. FREQUENCY MODULATION USING MICROWAVE FREQUENCIES AND LARGE MODULATION INDICES IS ALSO DISCUSSED AS AN EXTERNAL TUNING METHOD. OF ALL THE APPROACHES, IT IS PROBABLY THE ONE THAT WILL PROVIDE THE SIMPLEST AND MOST EFFECTIVE SOLUTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-608 817
ARMY ELECTRONICS LABS FORT MONMOUTH N J

PULSE MODULATION OF AN ELECTRON INJECTION LASER TRANSMISSION SYSTEM. (U)

52 3P SCHIEL,F. J. ;BULLWINKEL,E. C. ; GAMMARINO,R. R. ;ARMARA,J. F. ;WEBB,R. E. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, LASERS), (*LASERS, LIGHT COMMUNICATION SYSTEMS), (*COMMUNICATION SYSTEMS, LASERS), TURBULENCE, DISTORTION, AUDIOFREQUENCY, PULSE MODULATION, FOURIER ANALYSIS, DESIGN, SIGNAL-TO-NOISE RATIO, LIGHT TRANSMISSION, GASES, HELIUM, NEON (U)
IDENTIFIERS: ELECTRON INJECTION LASERS (U)

AMPLITUDE MODULATION OF GAS LASERS IN CW OPERATION ARE EASILY ACHIEVABLE IN THE AUDIO FREQUENCY RANGE EITHER BY MODULATION OF THE RF PUMP POWER OR BY ELECTRO-OPTICAL OR PIEZOELECTRIC MODULATORS. IN INITIAL EXPERIMENTS A HE-NE GAS LASER (SPECTRA PHYSICS NR. 112) WITH HEMISPHERICAL RESONATOR ARRANGEMENT EMITTING AT 6328 WAS EMPLOYED. PUMP MODULATION ALLOWED A MODULATION DEPTH OF THE EMITTED COHERENT RADIATION OF 100% WITH AN AVERAGE POWER OUTPUT OF THREE MILLIWATTS. THE LIGHT SIGNAL WAS COLLECTED IN A 4 FOOT TELESCOPE (QUESTAR) AND RECEIVED BY AN RCA 7265 PHOTOMULTIPLER. THIS EXPERIMENTAL SYSTEM WAS USED FOR THE TRANSMISSION OF ONE AUDIO CHANNEL. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-609 646
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS

APPLICATIONS OF LASERS. (U)

DESCRIPTIVE NOTE: SPECIAL REPORTS,
NOV 64 43P STICKLEY,C. MARTIN ;
PROJ: 4645
MONITOR: AFCRL ,AFCRL 64-914,SR15

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: A SHORTER VERSION OF A PAPER PREPARED FOR A SEMINAR ON LASERS HELD IN AUGUST 1964 AT NEW YORK CITY UNDER THE SPONSORSHIP OF THE EDUCATION AND RESEARCH ASSOCIATION.

DESCRIPTORS: (*LASERS, SYMPOSIA), INSTRUMENTATION, COMMUNICATION SYSTEMS, SPACE COMMUNICATION SYSTEMS, METALLURGY, MACHINING, MEDICAL RESEARCH, BIOLOGY, RETINA, RUBY, TRACKING, ACOUSTICS, ROMAN SPECTROSCOPY, ELECTRON OPTICS, COMPUTERS, PHOTOGRAPHY, DEFENSE SYSTEMS (U)

FUNDAMENTALLY THIS ARTICLE IS A SURVEY OF APPLICATIONS OF LASERS. THE APPLICATIONS ARE DIVIDED INTO SIX MAJOR AREAS: PRECISION MEASUREMENTS, COMMUNICATIONS, BIOLOGICAL AND MEDICAL, OTHER SCIENTIFIC AREAS, METALWORKING, AND MISCELLANEOUS. A TABLE OF THE BASIC CHARACTERISTICS OF THE MAJOR TYPES OF LASERS IS PROVIDED SO THAT THE USER CAN BE MADE AWARE OF THE LIMITATIONS AND CAPABILITIES OF LASERS. GOOD EXAMPLES OF APPLICATIONS IN EACH OF THESE AREAS ARE DESCRIBED IN SOME DETAIL TO ILLUSTRATE WHICH MAJOR PROPERTIES OF LASER RADIATION ARE USEFUL IN THAT PARTICULAR AREA. MOST OF THE DISCUSSION PERTAINS TO PRESENT-DAY APPLICATIONS BUT IN SOME INSTANCES WHAT APPEAR TO BE GOOD FUTURE APPLICATIONS ARE ALSO DESCRIBED. SEVENTY-TWO REFERENCES TO THE TECHNICAL LITERATURE THAT RELATE TO APPLICATIONS ARE PROVIDED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-610 071
NAVAL ORDNANCE LAB WHITE OAK MD

TRANSMISSION OF GREEN LASER LIGHT (5300A) THROUGH WATER, (U)

SEP 64 29P MATLACK,D. F. ;TEMPLIN,H. A. ; TALBERT,W. W. ;
REPT. NO. NOLTR-64-179
TASK: RUDC4B000 212 1F001 05 02

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LIGHT TRANSMISSION, WATER), (*LASERS, LIGHT TRANSMISSION), (*WATER, LIGHT TRANSMISSION), NEODYMIUM, LIGHT, COLORS, ELECTROMAGNETIC WAVES, PROPAGATION, LIQUIDS, ATTENUATION, UNDERWATER COMMUNICATION SYSTEMS, MEASUREMENT, TEST METHODS, TEST EQUIPMENT, OPTICAL EQUIPMENT, NAVAL RESEARCH LABORATORIES, OPTICS, RANGE FINDING, UNDERWATER (U)

THE EXTINCTION COEFFICIENT OF FILTERED POTOMAC RIVER WATER WAS MEASURED AT THE FREQUENCY DOUBLED NEODYMIUM 'GREEN LASER' WAVELENGTH OF 5300A. MEASUREMENTS WERE CONDUCTED IN SITU AT THE DAVID TAYLOR MODEL BASIN (DTMB) IN A COOPERATIVE PROGRAM WITH THE NAVAL RESEARCH LABORATORY (NRL). EXTINCTION COEFFICIENTS OF 0.097, 0.104 AND 0.119/M WERE MEASURED ON 4, 5 AND 8 JUNE 1964, RESPECTIVELY. THE INCREASE IN ATTENUATION WITH TIME IS CONFIRMED BY FILTERED ARC LIGHT MEASUREMENTS MADE BY THE NRL AND IS ATTRIBUTED TO CONTAMINATION OF THE WATER AFTER THE BASIN FILTRATION SYSTEM WAS TURNED OFF. SCATTERING EXPERIMENTS INDICATE THAT THE AUREOLE EFFECT FOR THE HIGHLY COLLIMATED LASER BEAM WAS SMALL OVER THE 200 METER RANGE OF THE MEASUREMENTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-610 130
LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY DIV

ELECTROMAGNETIC LIGHT WAVES IN COMMUNICATION ENGINEERING, (U)

JAN 65 17P PROCHAZKA,MIROSLAV ;
REPT. NO. ATD-T-65-2
MONITOR: TT , 65 60830

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SVETELNE ELECTROMAGNETICKE VLENENIVE SDELOVACI TECHNICE, TRANS. OF SLABOPROUDY OBZOR (CZECHOSLOVAKIA) 1964, V. 25, NO. 6, P. 313-318.

DESCRIPTORS: (*COMMUNICATION THEORY, LIGHT COMMUNICATION SYSTEMS), (*LIGHT COMMUNICATION SYSTEMS, COMMUNICATION THEORY), (*ELECTROMAGNETIC WAVES, PROPAGATION), (*LASERS, LIGHT COMMUNICATION SYSTEMS), WAVE TRANSMISSION, LIGHT, MODULATION, OSCILLATION, DEMODULATORS, RADIO WAVES, QUANTUM MECHANICS, OPTICS, ELECTRIC CURRENTS, SIGNAL-TO-NOISE RATIO, ATMOSPHERE, METEOROLOGICAL PARAMETERS (U)

BASIC QUESTIONS RELATED TO THE USE OF LIGHT WAVES FOR TRANSMISSION OF INFORMATION ARE TREATED. THE GENERATION OF LIGHT WAVES, THEIR MODULATION, AND DETECTION ARE COVERED. MAIN EMPHASIS IS PLACED ON THE TRANSMISSION OF INFORMATION IN THE ATMOSPHERE UNDER NORMAL METEOROLOGICAL CONDITIONS AND BY MEANS OF LIGHT GUIDES. THE POSSIBILITY OF USING LIGHT WAVES FOR INFORMATION TRANSMISSION IN THE NEAR FUTURE IS CRITICALLY EVALUATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-610 422
DELAWARE UNIV NEWARK

QUANTUM LIMITATIONS TO ELECTROMAGNETIC SIGNAL MEASUREMENTS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JAN 63-31 DEC 64,
DEC 64 15P BOLGIANO,L. PAUL ,JR.;
CONTRACT: AF AFOSR2.63
MONITOR: AFOSR , 65 0028

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMUNICATION THEORY, QUANTUM MECHANICS), (*PHOTOELECTRIC EFFECT, COMMUNICATION THEORY), ELECTROMAGNETIC WAVES, COMMUNICATION SYSTEMS, ILLUMINATION, LIGHT, SIGNALS, NARROWBAND, FOURIER ANALYSIS, PROBABILITY, STATISTICAL ANALYSIS (U)
IDENTIFIERS: OPTICAL COMMUNICATION SYSTEMS, PHOTODETECTION (U)

IT WAS FOUND POSSIBLE TO DEVELOP A MATHEMATICAL THEORY OF COMMUNICATION WHICH INCLUDES QUANTUM EFFECTS, AND AS IS ALSO IMPORTANT, REDUCES TO THE MATHEMATICS OF CLASSICAL COMMUNICATION THEORY WHEN QUANTUM EFFECTS CAN BE NEGLECTED. BECAUSE PHOTOELECTRIC DETECTION IS USED UNIVERSALLY AT OPTICAL FREQUENCIES, AND BECAUSE IT LENDS ITSELF TO A SIMPLER THEORETICAL DESCRIPTION, EARLIER PUBLICATIONS HAVE CONSIDERED THE STATISTICS OF PHOTO DETECTION - HOW THEY DIFFER FOR COHERENT AND INCOHERENT SIGNALS, AND THE CONSEQUENCES OF THESE DIFFERENCES FOR INFORMATION TRANSMISSION. THE WORK WAS CONCENTRATED IN TWO MAJOR AREAS: (A) STATISTICS OF PHOTODETECTION, AND (B) QUANTUM STATISTICAL ANALYSIS OF COMMUNICATION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-612 725
PERKIN-ELMER CORP NORWALK CONN

INVESTIGATION OF TECHNIQUES FOR MODULATING AND SCANNING A LASER BEAM TO FORM A VISUAL DISPLAY. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR JUN 63-JUN 64,
JAN 65 353P YODER,PAUL R. ;
REPT. NO. ER-7600
CONTRACT: AF30 602 3122
PROJ: 5578
TASK: 557803
MONITOR: RADC , TDR-64-365

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, DISPLAY SYSTEMS), (*DISPLAY SYSTEMS, LASERS), (*ELECTRON OPTICS, LASERS), LIGHT, VIDEO SIGNALS, MODULATION, DEFLECTION, MODULATORS, CRYSTALS, POTASSIUM COMPOUNDS, HYDROGEN COMPOUNDS, PHOSPHATES, OPTICAL SCANNING, MIRRORS, BARIUM COMPOUNDS, TITANATES, SYNCHRONIZATION (ELECTRONICS), LIGHT COMMUNICATION SYSTEMS (U)

VARIOUS TECHNIQUES WHICH MIGHT BE USED TO MODULATE AND DEFLECT A LASER BEAM IN RESPONSE TO AN INPUT VIDEO SIGNAL SO AS TO FORM A PROJECTED VISUAL DISPLAY CONTAINING 1,000,000 RESOLVED INFORMATION BITS AT 30 FRAMES PER SECOND ARE CONSIDERED IN THIS REPORT. ELECTRO-OPTICAL MODULATION TECHNIQUES ARE EVALUATED IN GENERAL AND THE POCKEL CELL USING POTASSIUM DIHYDROGEN PHOSPHATE IS CONSIDERED IN DETAIL. SLOW SCANNING OF THE BEAM AT 30 CYCLES PER SECOND IS FOUND TO BE FEASIBLE USING A PIEZOELECTRICALLY DRIVEN NODDING MIRROR SCANNER. SEVERAL FAST SCANNING TECHNIQUES ARE INVESTIGATED THEORETICALLY AND ONE TYPE DEVICE USING A PRISM OF BARIUM TITANATE ELECTRO-OPTICALLY ACTIVE CRYSTALLINE MATERIAL IS ALSO EVALUATED EXPERIMENTALLY. BRIEF CONSIDERATION OF PHOTOMETRIC AND SYNCHRONIZATION ASPECTS OF LASER DISPLAY SYSTEMS INDICATES NO PARTICULAR PROBLEM AREAS TO BE RESOLVED IN DEVELOPMENT OF ACTUAL HARDWARE SYSTEMS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z LW13

AD-614 042
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF

TECHNICAL PROGRESS ON FUNDAMENTAL AND APPLIED RESEARCH PROGRAMS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. FOR JAN-MAR65.
MAR 65 293P
REPT. NO. 6-75-65-10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, SCIENTIFIC RESEARCH), (*DOCUMENTATION, SCIENTIFIC RESEARCH), (*ELECTRONICS, SCIENTIFIC RESEARCH), (*PHYSICS, SCIENTIFIC RESEARCH), REPORTS, ELECTRONS, SCATTERING, PLASMA PHYSICS, ELECTROMAGNETIC WAVES, PROPAGATION, SOLID STATE PHYSICS, CESIUM, CRYSTALS, EXCITATION, SEMICONDUCTORS, SPECTROSCOPY, QUANTUM MECHANICS, MAGNETIC MATERIALS, FERROMAGNETIC MATERIALS, SUPERCONDUCTIVITY, MAGNETIC TAPE, LIQUIDS, INFORMATION RETRIEVAL, STORAGE TUBES, DISPLAY SYSTEMS, ELECTRONICS LABORATORIES, COMMUNICATION THEORY (U)

CONTENTS: PHYSICAL ELECTRONICS, SOLID STATE PHYSICS, LIQUID STATE PHYSICS, INFORMATION SCIENCES, LASERS AND COMMUNICATION THEORY. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-614 870
F MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

X-BAND MODULATION OF GAAS LASERS, (U)

DEC 64 1P GOLDSTEIN,B. S. ;WEIGAND,R. M. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN PROCEEDINGS OF THE IEEE V53 N2 P195 FEB 1965 (COPIES NOT AVAILABLE TO DDC OR CLEARINGHOUSE CUSTOMERS).

DESCRIPTORS: (*LASERS, AMPLITUDE MODULATION), X BAND, DIODES (SEMICONDUCTOR), GALLIUM ALLOYS, ARSENIC ALLOYS, INJECTION, TRAVELING-WAVE TUBES, COUPLING CIRCUITS, RADIOFREQUENCY POWER (U)

THIS CORRESPONDENCE REPORTS CW AMPLITUDE MODULATION OF GAAS INJECTION LASERS AT X BAND. THE HIGHEST MODULATION FREQUENCY WAS 11 GC/S, A LIMIT IMPOSED BY COMPONENTS OF THE EXPERIMENTAL SETUP. THE X-BAND MODULATING SIGNAL IS AMPLIFIED IN A TRAVELING-WAVE AMPLIFIER AND COUPLED TO THE LASER. TWO DIRECTIONAL COUPLERS MONITOR THE FORWARD AND REFLECTED RF POWER. THE RF POWER IS COUPLED TO THE LASER IN A WAVEGUIDE STRUCTURE. IN THIS STRUCTURE, THE COPPER FINS ACT AS A SHORT CIRCUIT TO THE X-BAND POWER WHILE THE MODULATED INFRARED RADIATION PASSES UNAFFECTED (NEGLECTING SOME BLOCKAGE). THE LASER, LOCATED BETWEEN TWO SECTIONS OF A COPPER POST, IS SPACED A HALF GUIDE WAVELENGTH (AT 9.1 GC/S) FROM THE RF SHORTCIRCUITING FINS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-617 717
NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF

FABRY-PEROT TYPE LASER MODULATORS. (U)

DESCRIPTIVE NOTE: TECHNICAL PROGRESS REPT. FOR JUL 63-JUL 64,
APR 65 45P MCCAULEY,DONALD G. ;
REPT. NO. TPR-386 ;NOTS-TP-3736
MONITOR: IDEP 461.85.00.00-X7-06

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, MODULATORS), (*MODULATORS, LASERS), (*INTERFEROMETERS, LASERS), (*LIGHT COMMUNICATION SYSTEMS, LASERS), PIEZOELECTRIC EFFECT, OSCILLATION, QUARTZ, POTASSIUM COMPOUNDS, PHOSPHATES, COMMUNICATION SATELLITES(PASSIVE), CRYSTAL STRUCTURE, REFRACTIVE INDEX (U)
IDENTIFIERS: ELECTRO-OPTIC EFFECT, FABRY-PEROT MODULATORS, POTASSIUM DIHYDROPHOSPHATE (U)

THIS REPORT DESCRIBES THE OPTICAL CHARACTERISTICS OF TWO PROTOTYPE LASER MODULATORS HAVING THE THIN, FLAT, DISK-SHAPED FABRY-PEROT (F-P) INTERFEROMETER DESIGN. THE MODULATORS ARE BEING USED TO INVESTIGATE THE USE OF LASER RADIATION IN COMMUNICATIONS. THE REPORT DISCUSSES THE INTENSITY MODULATION RESULTING BOTH FROM THE CONVERSEPIEZOELECTRICALLY-INDUCED OSCILLATIONS IN THE PHYSICAL SEPARATION OF THE INTERFEROMETER REFLECTORS AND FROM THE ELECTROOPTICALLY-INDUCED OSCILLATIONS IN THE OPTICAL SEPARATION OF THE INTERFEROMETER REFLECTORS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-618 297
NORTHEASTERN UNIV BOSTON MASS

RESEARCH ON STORAGE DIODE LASERS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL SUMMARY REPT. FOR 1 APR 63-15 MAY 64,
MAY 64 2P SEED,RICHARD G. ;HERGENROTHER, KARL . ;
CONTRACT: NONR410602
PROJ: ARPA ORDER 306 62

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, DIODES(SEMICONDUCTOR)), (*DIODES(SEMICONDUCTOR), LASERS), CIRCUITS, DESIGN, EFFECTIVENESS, CONFIGURATION, CRYOGENICS, RANGE FINDING, LIGHT COMMUNICATION SYSTEMS, LIGHT PULSES, GALLIUM COMPOUNDS, ARSENIDES, GERMANIUM, SILICON (U)
IDENTIFIERS: STORAGE DIODE LASERS (U)

RESEARCH ON A PROPOSED STORAGE DIODE LASER IS DESCRIBED. THE OBJECTIVES ARE (1) COMPLETION OF DESIGN THEORY (2) BASIC PARAMETER MEASUREMENTS (3) EXPERIMENTAL PROOF (4) FABRICATION OF EFFECTIVE DEVICES. THE DESIRABILITY OF SUCH A DEVICE IN MANY POTENTIAL APPLICATIONS IS DISCUSSED. THE DESIGN THEORY IS PRESENTED IN DETAIL. FOUR POSSIBLE STORAGE DIODE LASER CONFIGURATIONS ARE DESCRIBED, OF WHICH THE MOST PROMISING INVOLVES A LOW CURRENT STORAGE PULSE AND HIGH CURRENT TRIGGER PULSE IN A LONG LIFETIME MATERIAL. THE POSSIBILITY OF OBTAINING LONG LIFETIME BY THE SHIFT FROM DIRECT TO INDIRECT TRANSITION IS DISCUSSED. NEGATIVE EXPERIMENTAL RESULTS WITH EXTREME HIGH CURRENT PULSES IN GERMANIUM AND SILICON ARE PRESENTED. REVERSE EMISSION OF GALLIUM ARSENIDE AND THE SHIFT OF THE ABSORPTION EDGE IN GERMANIUM ARE DESCRIBED. THE DESIGN OF DIODE LASER PULSERS IS REVIEWED IN GENERAL. THREE SPECIFIC CIRCUIT CONFIGURATIONS ARE PRESENTED. AN ELECTRICAL DOUBLE PULSER IS DESCRIBED. THE TECHNOLOGY OF IMAGE CONVERTERS AND COOLERS USED IS DESCRIBED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-621 053
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

OPTICAL COMMUNICATIONS, (U)

JUN 65 11P CHIA-SUNG,LIU ;
REPT. NO. FTD-TT-65-95
MONITOR: TT , 65-63953

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF K'O HSUEH TA CHUNG (CHINESE PEOPLE'S REPUBLIC) N2 P46-7, 64 1964.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, LASERS), (*LASERS, LIGHT COMMUNICATION SYSTEMS), AMPLITUDE MODULATION, WAVEGUIDES, PHOTOMULTIPLIERS, CHINA, THEORY (U)

A GENERAL DESCRIPTION OF THE THEORY AND APPLICATIONS OF OPTICAL COMMUNICATION SYSTEMS IS PRESENTED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-621 114
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

SEMICONDUCTOR LASERS. (U)

DESCRIPTIVE NOTE: MEETING SPEECH,
MAY 65 12P LAX,BENJAMIN ;
REPT. NO. MS-779E
CONTRACT: AF19 628 5167
MONITOR: ESD , TDR-65-319

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, V122 ARTICLE2 P598-607 MAY 28 1965 (COPIES NOT AVAILABLE TO DDC OR CLEARINGHOUSE CUSTOMERS).

DESCRIPTORS: (*LASERS, DIODES(SEMICONDUCTORS)), (*DIODES(SEMICONDUCTOR), LASERS), SEMICONDUCTOR DEVICES, GALLIUM ALLOYS, ARSENIC ALLOYS, MAGNETIC PROPERTIES, LIGHT COMMUNICATION SYSTEMS, INFRARED EQUIPMENT, RADAR EQUIPMENT (U)
IDENTIFIERS: GALLIUM ARSENIDES (U)

SEMICONDUCTOR LASERS ARE THE MOST RECENT ADDITIONS TO THE GROWING FAMILY OF THESE NEW COHERENT SOURCES OF LIGHT. ALTHOUGH THEIR CONCEPTION IS ALMOST TEN YEARS OLD, THE TECHNOLOGY WAS NOT SUFFICIENTLY ADVANCED UNTIL TWO YEARS AGO WHEN HIGHLY EFFICIENT LUMINESCENT DIODES OF GALLIUM ARSENIDE WERE DISCOVERED. THE DEVELOPMENT OF THE LASER ITSELF BY THE GROUPS AT GENERAL ELECTRIC, IBM, AND LINCOLN LABORATORY SHORTLY AFTERWARDS WAS READILY FORESEEN. TODAY THE PREOCCUPATION OF MANY INDUSTRIAL, UNIVERSITY, AND GOVERNMENT LABORATORIES WITH RESEARCH AND DEVELOPMENT HAS GIVEN RISE TO MANY PUBLICATIONS, WHICH INDICATE A LIVELY INTEREST AND PROMISING FUTURE FOR THESE DEVICES. THE ACTIVITY IS WELL BALANCED BETWEEN THE BASIC PHYSICS AND THE APPLIED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-621 204
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

PROPERTIES OF THE PBSE DIODE LASER. (U)

JAN 65 4P BUTLER, JACK F. ;CALAWA, ARTHUR R. ;REDIKER, ROBERT H. ;
REPT. NO. JA-2517
CONTRACT: AF19 628 5167
MONITOR: ESD , TDR-65-430

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN IEEE JOURNAL OF QUANTUM ELECTRONICS, VQE-1 N1 P4-7 APR 1965. (COPIES NOT AVAILABLE TO DDC OR CLEARINGHOUSE CUSTOMERS).

DESCRIPTORS: (*LASERS, DIODES(SEMICONDUCTOR)), (*DIODES(SEMICONDUCTOR), LASERS), (*LEAD ALLOYS, SELENIUM ALLOYS), INFRARED COMMUNICATION SYSTEMS, INFRARED WINDOWS, HAZE, ATTENUATION, CRYSTAL STRUCTURE, HEAT TREATMENT, INFRARED SPECTROSCOPY (U)

DIODE LASER ACTION HAS BEEN OBTAINED AT 8.5 MICRONS WITH PBSE. THIS LASER IS OF POTENTIAL INTEREST FOR TERRESTRIAL COMMUNICATIONS SINCE ITS EMISSION IS IN THE 8-TO-14MICRONS ATMOSPHERIC WINDOW, A SPECTRAL REGION OF HIGH ATMOSPHERIC TRANSPARENCY WHERE ATTENUATION DUE TO SCATTERING BY HAZE IS LOW. FABRICATION TECHNIQUES ARE DESCRIBED WHICH ARE BASED ON CONTROLLING CARRIER TYPE AND CONCENTRATION BY ADJUSTING THE PB:SE RATIO. BELOW THRESHOLD FOR LASER ACTION, THE EMISSION EXHIBITS TWO SPECTRAL PEAKS, ONE NEAR 8.5 MICRONS WHICH INCREASES SUPERLINEARLY WITH CURRENT AND ANOTHER NEAR 10.1 MICRONS WHICH INCREASES SLOWLY WITH CURRENT. LASER ACTION ASSOCIATED WITH THE 8.5 MICRONS PEAK IS OBSERVED ABOVE A THRESHOLD CURRENT DENSITY OF 2000 A 1/CM-SQ. FROM MEASUREMENTS WHICH DID NOT RESOLVE THE CAVITY MODE STRUCTURE, THE EMISSION PEAK WAS FOUND TO SHIFT TO HIGHER ENERGIES IN A (100) ORIENTED MAGNETIC FIELD AT THE RATE OF 7.1 X 10 TO THE -8TH POWER EV PER GAUSS, OR 17 MC/S PER GAUSS. THIS IS THE EXPECTED SHIFT IF THE EMISSION IS ASSOCIATED WITH BAND-TO-BAND TRANSITIONS. THE THRESHOLD CURRENT DECREASED TO A FRACTION OF ITS ZERO FIELD VALUE IN A MAGNETIC FIELD OF APPROXIMATELY 10 KILOGAUSS, THEN INCREASED SLOWLY WITH HIGHER FIELDS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-622 575
UNITED AIRCRAFT CORP EAST HARTFORD CONN RESEARCH LABS

ULTRASONIC LASER MODULATION TECHNIQUES. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JUL 64-30 JUN 65,
JUN 65 133P DEMARIA,A. J. ;FLINCHBAUGH,D.
E. ;DANIELSON,G. E. ,JR.;
REPT. NO. D920259-12
CONTRACT: DA28 043AMC00259E
PROJ: DA 1P622001A056

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: CONTINUATION OF CONTRACT DA19 020AMC0170A. SEE ALSO AD-613 196.

DESCRIPTORS: (*LASERS, MODULATION), (*LIGHT TRANSMISSION, MODULATION), (*ULTRASONIC RADIATION, MODULATORS), (*MODULATORS, ULTRASONIC RADIATION), OPTICS, ACOUSTICS, REFRACTION, DIFFRACTION, MATHEMATICAL MODELS, ANALOG COMPUTERS, INTERFEROMETERS, NEODYMIUM, GLASS, OSCILLATORS (U)

THE FEASIBILITY OF INTERNALLY MODULATING THE OUTPUT OF SOLID-STATE LASERS WITHOUT HAVING TO INSERT LOSSY ELEMENTS INTO THE FABRY-PEROT FEEDBACK INTERFEROMETER HAS BEEN DEMONSTRATED BY THE PROPAGATION OF FOCUSED ACOUSTIC WAVES WITHIN A GLASS LASER ROD. THESE STUDIES HAVE SHOWN THAT THE ESTABLISHMENT OF AN ALTERNATING CONVERGINGDIVERGING WAVEGUIDE EFFECT BY THE PROPAGATION OF ACOUSTIC WAVES WITHIN THE LASER INTERFEROMETER RESULTS IN GATING OF A ND(3+) GLASS LASER AT THE ACOUSTIC FREQUENCY, AN INCREASE IN OUTPUT ENERGY BY AS MUCH AS 100%, AND AN ABSENCE OF DISCRETE AXIAL MODES UNDER GATING CONDITIONS. THE COMPLEXITY OF THE INTEGRAL EQUATIONS DESCRIBING THE SLOPE AND TRAJECTORIES OF LIGHT RAYS TRAVERSING VARIOUS PERIODIC REFRACTIVE INDEX VARIATIONS GENERATED BY ACOUSTIC WAVES LED TO THE USE OF ANALOG COMPUTER TECHNIQUES FOR SOLVING THREE DIFFERENTIAL EQUATIONS FOR THE SLOPE AND TRAJECTORIES OF THE LIGHT RAYS. THE USE OF THE SLOPE SOLUTIONS FOR DESIGNING A FABRY-PEROT LASER INTERFEROMETER CONFIGURATION FOR PULSE SHAPING THE OUTPUT OF LASER OSCILLATORS IS DESCRIBED. THE TRAJECTORY SOLUTIONS DESCRIBE THE OPERATION OF THE CONVERGING-DIVERGING WAVEGUIDE MODULATION EFFECT WITHIN THE LASER'S INTERFEROMETER. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-627 084 20/5 9/1 17/2
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J ELECTRONIC COMPONENTS LAB

HIGH-POWER GALLIUM ARSENIDE LASER DIODES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
OCT 65 24P WANDINGER,L. ;KLOHN,K. L. ;
PROJ: DA-1P6-22001-A-056
TASK: 1P6-22001-A-056-03
MONITOR: ECOM , 2629

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, DIODES(SEMICONDUCTOR), (*DIODES(SEMICONDUCTOR), LASERS), (*GALLIUM ALLOYS, ARSENIC ALLOYS), PULSE COMMUNICATION SYSTEMS, PULSE MODULATION, INFRARED COMMUNICATION SYSTEMS, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: GALLIUM ARSENIDE (U)

THE ESSENTIAL FEATURES IN THE DESIGN, DEVELOPMENT, AND PERFORMANCE OF GAAS P-N JUNCTION LASER DIODES WITH HIGH OUTPUT IN THE COHERENT BEAM FOR APPLICATION IN SECURE COMMUNICATION SYSTEMS ARE DISCUSSED. AFTER A BRIEF REVIEW OF DEVICE DESIGN PRINCIPLES, THE TECHNOLOGY OF WAFER PREPARATION, DIFFUSION OF EXTREMELY PLANAR P-N JUNCTIONS AND THE FORMATION OF OHMIC, LOW RESISTANCE, AREA CONTACTS DEVELOPED AT THIS COMMAND IS PRESENTED. MEASUREMENT TECHNIQUES TO DETERMINE THE PERFORMANCE CHARACTERISTICS OF THESE LASERS SUCH AS THRESHOLD CURRENT DENSITY, OUTPUT POWER, EXTERNAL QUANTUM EFFICIENCY, SPECTRAL DISTRIBUTION AND LINEWIDTH OF EMITTED RADIATION ARE DISCUSSED. EXPERIMENTAL UNITS WITH A TOTAL AVERAGE POWER OUTPUT IN THE COHERENT BEAM OF MORE THAN THREE WATTS CORRESPONDING TO A QUANTUM EFFICIENCY OF 15 PERCENT HAVE BEEN MADE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-627 266 14/5 20/5
MICHIGAN UNIV ANN ARBOR

SYNTHETICAL METHODS IN ELECTRO-OPTICAL SCIENCE. (U)

DESCRIPTIVE NOTE: SEMI-ANNUAL REPT.,
OCT 65 36P STROKE,GEORGE W. ;
CONTRACT: NONR-1224(54)

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PHYSICS LETTERS V18 N2 P116-8 15 AUG 1965. NATURE V208 N5016 P1159-62 18 DEC 1965. AGARD PROCEEDINGS, N. A. T. O. MEETING, PARIS, FRANCE 6-9 SEP 1965. COPIES TO DDC USERS ONLY.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PHOTOGRAPHIC TECHNIQUES, LASERS), (*OPTICAL IMAGES, SYNTHESIS), ELECTROOPTICS, LIGHT, PHASE MODULATION, INTERFEROMETERS, AMPLITUDE MODULATION, PHOTOGRAPHIC IMAGES, RESOLUTION, FOURIER ANALYSIS (U)
IDENTIFIERS: HOLOGRAPHY (U)

THREE PAPERS ARE INCLUDED; THEIR TITLES ARE: OPTICAL IMAGE SYNTHESIS (COMPLEX AMPLITUDE ADDITION AND SUBTRACTION) BY HOLOGRAPHIC FOURIER TRANSFORMATION; RECONSTRUCTION OF PHASE OBJECTS BY HOLOGRAPHY; ELECTRO-OPTICAL IMAGE SYNTHESIS AND COMMUNICATIONS BY HOLOGRAPHIC (WAVE FRONT-RECONSTRUCTION) METHODS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-628 546 9/4 20/3
DELAWARE UNIV NEWARK DEPT OF ELECTRICAL ENGINEERING

COMMUNICATION CHARACTERISTICS OF PHOTOELECTRIC DETECTION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUN 64 68P DEAL,JOSEPH HAMILTON ,JR.;
REPT. NO. TR-Q41,
CONTRACT: AF-AFOSR-2-63,
MONITOR: AFOSR , 65-0027

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: MASTER'S THESIS.

DESCRIPTORS: (*INFORMATION THEORY, PHOTOELECTRIC EFFECT), (*PHOTOELECTRIC EFFECT, DEMODULATORS), (*DEMODULATORS, PHOTOELECTRIC EFFECT), SIGNAL TO-NOISE RATIO, LASERS, LIGHT COMMUNICATION SYSTEMS, WAVE FUNCTIONS, QUANTUM MECHANICS, THERMAL RADIATION, NOISE(RADIO) (U)
IDENTIFIERS: OPTICAL FREQUENCY (U)

THE PROBABILISTIC NATURE OF THE PHOTOELECTRIC CONVERSION PROCESS AUGMENTS OTHER SOURCES OF NOISE IN LIMITING THE PRECISION WITH WHICH ELECTROMAGNETIC SIGNALS MAY BE MEASURED WITH A PHOTOELECTRIC DETECTOR. THIS REPORT DEVELOPS PROCEDURES FOR CONSIDERING THIS ADDED UNCERTAINTY IN SIGNAL MEASUREMENTS OF INTEREST FOR RADIO TYPE COMMUNICATION AT OPTICAL FREQUENCIES. A PROBABILISTIC MODEL OF AN IDEAL PHOTODETECTOR IS USED, IN CONJUNCTION WITH THE CLASSICAL WAVE THEORY OF THERMAL NOISE, TO COMPUTE UNCERTAINTIES ASSOCIATED WITH THE LACK OF PREDICTIBILITY INHERENT IN BOTH PHOTOELECTRIC CONVERSION AND THERMAL PROCESSES. IT IS SHOWN HOW THE UNCERTAINTY IN THE DETECTOR OUTPUT MAY BE CHARACTERIZED BY A SIGNAL-TO-NOISE RATIO, AND ALSO HOW DECISION CRITERIA FOR SIGNAL DETECTION MAY BE BASED ON THE PROBABILITY FUNCTIONS WHICH CHARACTERIZE THE DETECTOR OUTPUT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-628 607 20/5
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

OPTICAL MISALIGNMENT DUE TO TEMPERATURE GRADIENTS IN ELECTROOPTIC MODULATOR CRYSTALS, (U)

APR 65 4P LOSCOE,CLARIE ;METTF,HERBERT
;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN APPLIED OPTICS, V5 N1 P93-6 JAN 1966. COPIES TO DDC USERS ONLY.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ELECTROOPTICS, MODULATORS), (*MODULATORS, MISALIGNMENT), (*THERMAL PROPERTIES, MODULATORS), LASERS, CRYSTALS, LIGHT COMMUNICATION SYSTEMS, INDEX OF REFRACTION, THERMAL EXPANSION, QUARTZ (U)

A POSSIBLE SOURCE OF MISALIGNMENT OF LIGHT IN AN OPTICAL COMMUNICATION SYSTEM, UTILIZING ELECTROOPTIC MODULATORS, IS THE DEFLECTION OF THE LIGHT BEAM WITHIN THE MODULATOR CRYSTAL DUE TO TEMPERATURE GRADIENTS. THE PRESENT PAPER INVESTIGATES THE LIGHT DEFLECTION RESULTING FROM A LINEAR TEMPERATURE GRADIENT ACROSS VARIOUS MODULATOR CRYSTALS. THE TOTAL EFFECT IS FOUND TO BE THE SUM OF TWO CONTRIBUTIONS, ONE DUE TO THE CRYSTAL EXPANSION, THE OTHER DUE TO THE INDEX OF REFRACTION GRADIENT, AND IS FOUND TO BE SMALLER, BY THE FACTOR 10, IN QUARTZ THAN IN KDP. THE EXPERIMENTAL METHOD DESCRIBED PROVIDES ALSO A SIMPLE WAY OF DETERMINING DN/DT IN CRYSTALS FOR BOTH ORDINARY AND EXTRAORDINARY RAYS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-629 473 17/2 22/1
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

A RED BEAM IN THE BLACK SKY, (U)

FEB 66 10P CHERNYSHEV,V. ;
REPT. NO. FTD-TT-65-1683,
MONITOR: TT , 66-60733

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. FROM KRASNAYA ZVEZDA, (USSR) 14 MAR P1 1965.

DESCRIPTORS: (*LASERS, SPACE COMMUNICATION SYSTEMS), (*SPACE COMMUNICATION SYSTEMS, ASTRONAUTICS), SPACE FLIGHT, RUBY, ATMOSPHERE, SEMICONDUCTORS, USSR (U)

TRANSLATION OF RUSSIAN RESEARCH: SPACE COMMUNICATION SYSTEMS; USE OF LASERS.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-629 503 20/5 17/2
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J ELECTRONIC COMPONENTS LAB

PULSE-CODE MODULATION MULTIPLEX TRANSMISSION OVER AN INJECTION LASER TRANSMISSION SYSTEM. (U)

OCT 65 2P SCHIEL,E. J. ;BULLWINKEL,E. C. ;WEIMER,R. B. ;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE IEEE V53 N12 P2140-1 DEC 1965. COPIES TO DDC USERS ONLY.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, DATA TRANSMISSION SYSTEMS), (*DATA TRANSMISSION SYSTEMS, LASERS), (*PULSE CODE MODULATION, MULTIPLEX), LIGHT COMMUNICATION SYSTEMS (U)
IDENTIFIERS: INJECTION LASERS (U)

REPRINT: PULSE-CODE MODULATION MULTIPLEX TRANSMISSION OVER AN INJECTION LASER TRANSMISSION SYSTEM.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-630 243 17/2 20/5 20/6
LINCOLN LAB MASS INST OF TECH LEXINGTON

OPTICAL COMMUNICATIONS EMPLOYING SEMICONDUCTOR LASERS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUN 65 73P CHATTERTON,E. J. ;
REPT. NO. TR-392,
CONTRACT: AF 19(628)-500,
MONITOR: ESD , TDR-65-232

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, LIGHT COMMUNICATION SYSTEMS), (*LIGHT COMMUNICATION SYSTEMS, LASERS), (*SEMICONDUCTORS, LASERS), LIGHT TRANSMISSION, ATMOSPHERE, FREQUENCY MODULATION, AMPLITUDE MODULATION, PULSE MODULATION, FIBER OPTICS, OPTICAL EQUIPMENT, NARROWBAND, CIRCUITS, ELECTRONIC EQUIPMENT, COMMUNICATION SYSTEMS (U)
IDENTIFIERS: OPTICAL COMMUNICATION SYSTEMS (U)

THIS REPORT DISCUSSES THE DEVELOPMENT OF OPTICAL COMMUNICATIONS EMPLOYING SEMICONDUCTOR LASERS-BOTH NONCOHERENT AND COHERENT. THE LARGE MODULATION BANDWIDTH OBTAINABLE WITH THESE DEVICES PERMITS THE DEVELOPMENT OF FREQUENCY- AND PULSE-MODULATION COMMUNICATIONS SYSTEMS WHICH OVERCOME SCINTILLATION NOISE PRODUCED BY THE TURBULENT ATMOSPHERE. EMPHASIS HAS BEEN PLACED ON THE DEVELOPMENT OF COMMUNICATIONS SYSTEMS FOR 98-PERCENT WEATHER CAPABILITY OVER SHORT RANGES, RATHER THAN FAIRWEATHER CAPABILITY OVER LONG RANGES. THE DEVELOPMENT OF SUPPORTING TECHNOLOGY IS PRESENTED IN THE AREAS OF SEMICONDUCTOR LASERS, FIBER OPTICS, OPTICAL SYSTEMS, NARROWBAND OPTICAL FILTERS, PHOTOMULTIPLIERS, AND FREQUENCY- AND PULSE-MODULATION ELECTRONIC CIRCUITRY AND COMPONENTS. MEASUREMENTS OF OPTICAL SIGNALS OVER A TWO-MILE PATH UNDER A FULL VARIETY OF WEATHER CONDITIONS HAVE PERMITTED A COMPARATIVE EVALUATION OF AM, FM, AND PM SYSTEMS. THE RESULTS SHOW CLEARLY THE ADVANTAGE OF FREQUENCY MODULATION AND PULSE MODULATION. MEASUREMENTS OF PULSES TRANSMITTED APPRECIABLY BEYOND THE LIMITS OF VISIBILITY IN SNOW AND FOG INDICATE A CHANNEL BANDWIDTH, LIMITED BY SCATTER-MULTIPATHS, BUT OF THE ORDER OF 200 MCPS. AN ANALYSIS IS PRESENTED OF MULTIPLE-SCATTER PATHS AND SYSTEM DESIGN CONSIDERATIONS FOR THESE CONDITIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-631 168 17/2 20/5
LINCOLN LAB MASS INST OF TECH LEXINGTON

SEMICONDUCTOR LASER COMMUNICATIONS THROUGH MULTIPLE-SCATTER PATHS, (U)

OCT 65 2P CHATTERTON,E. J. ;
REPT. NO. JA-2664,
CONTRACT: AF 19(628)-5167,
MONITOR: ESD , TDR-66-150

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE IEEE V53 N12 P2114-5 DEC 1965. COPIES TO DDC USERS ONLY.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, *LASERS), LIGHT TRANSMISSION, SCATTERING, AEROSOLS, ATMOSPHERIC MOTION, MODULATION, FIBER OPTICS, SEMICONDUCTOR DEVICES (U)

THE REPORT RELATES TO LIMITATIONS ON RANGE AND RELIABILITY OF WIDE-BAND LASER COMMUNICATIONS CAUSED BY ATMOSPHERIC TURBULENCE AND MULTIPLE-SCATTERING AEROSOLS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-635 749 17/2 20/5 9/1
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

P-N JUNCTION LASERS FOR COMMUNICATION SYSTEMS. (U)

APR 65 7P WANDINGER, LOTHAR ;KLOHN, KENNETH L. ;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS VAES-2 N3 P271-7 MAY 1966.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, LIGHT COMMUNICATION SYSTEMS), (*DIODES(SEMICONDUCTOR), LASERS), GALLIUM ALLOYS, ARSENIC ALLOYS, VOICE COMMUNICATION SYSTEMS, PUMPING(OPTICAL), PULSE MODULATION, COMMUNICATION EQUIPMENT, SEMICONDUCTORS (U)

SECURE GROUND-TO-GROUND COMMUNICATION LINKS, COMMUNICATION FROM SATELLITES AND SPACE PROBES, AND COHERENT OPTICAL LOGIC IN HIGH-SPEED INTEGRATED COMPUTERS LIE WITHIN THE REALM OF SEMICONDUCTOR SINGLE LASERS OR LASER ARRAYS. LASERS OF THIS TYPE HAVE THE ADVANTAGE OF EXTREMELY SMALL SIZE, EASE OF DIRECT MODULATION, AND HIGH EFFICIENCY. RUGGEDNESS AND SIMPLICITY OF PUMPING PROMISE HIGH RELIABILITY FOR MILITARY ELECTRONICS. A DISCUSSION IS PRESENTED ON DESIGN CONSIDERATIONS, TECHNOLOGICAL PROBLEMS, AND PERFORMANCE OF P-N JUNCTION LASERS FOR SHORT RANGE COMMUNICATION SYSTEMS. AFTER A BRIEF REVIEW OF FUNDAMENTAL PRINCIPLES FOR LASING ACTION IN SEMICONDUCTORS, AN ACCOUNT IS PRESENTED OF PREVIOUSLY UNPUBLISHED TECHNOLOGICAL PROCEDURES REQUIRED TO ACHIEVE GAAS LASER DIODES WITH HIGH OUTPUT IN THE COHERENT BEAM AT A HIGH PULSE RATE REQUIRED TO OPERATE A PULSE CODE, MODULATED VOICE TRANSMISSION SYSTEM. A DESCRIPTION IS GIVEN OF WAFER PREPARATION, DIFFUSION OF EXTREMELY PLANAR P-N JUNCTIONS, AND THE FORMATION OF OHMIC, LOW-RESISTANCE AREA CONTACTS. MEASUREMENT TECHNIQUES TO DETERMINE THE PERFORMANCE CHARACTERISTICS OF THESE LASERS WITH RESPECT TO SUCH FACTORS AS THRESHOLD CURRENT DENSITY, MAXIMUM OUTPUT POWER, EXTERNAL QUANTUM EFFICIENCY, SPECTRAL DISTRIBUTION, AND LINEWIDTH OF EMITTED RADIATION ARE DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-642 514 20/5 20/12
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF ELECTRICAL ENGINEERING

EFFECTS OF PRESSURE ON A SEMICONDUCTOR LASER RADIATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
SEP 66 146P FILHO,JOSE ELLIS RIPPER ;
REPT. NO. TR-5
CONTRACT: DA-31-124-ARO(D)-92 ,NONR-1841(51)

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, *LASERS), (*LEAD COMPOUNDS, *BAND THEORY OF SOLIDS), SULFIDES, SELENIDES, TELLURIDES, GALLIUM ALLOYS, ARSENIC ALLOYS, PRESSURE, EMISSIVITY, MODULATION, MOMENTUM, DEFORMATION, POLARIZATION, GAIN, FREQUENCY, CARRIERS(SEMICONDUCTORS), ULTRASONIC RADIATION, DOPING (U)
IDENTIFIERS: AUGMENTED PLANE WAVE METHODS, GALLIUM ARSENIDE, LEAD SELENIDE, LEAD SULFIDE, LEAD TELLURIDE, SEMICONDUCTOR LASERS (U)

THE RESULTS OF THE RELATIVISTIC APW CALCULATION OF THE BAND STRUCTURE, MOMENTUM MATRIX ELEMENTS AND DEFORMATION POTENTIALS OF THE LEAD SALTS ARE USED TO CALCULATE THE EFFECTS OF CONSTANT PRESSURE ON LASERS MADE OF THESE MATERIALS. BEHAVIOR OF THE FREQUENCY, POLARIZATION AND RELATIVE GAIN OF THESE LASERS ARE CALCULATED FOR SEVERAL DOPINGS, AND INJECTION LEVELS, WHEN ISOTROPIC AND UNIAXIAL PRESSURES ARE APPLIED. THE EFFECT OF SMALL DYNAMIC PRESSURE ON SEMICONDUCTOR LASERS IS ANALYZED, RESULTING IN A FREQUENCY MODULATION OF THE LASER RADIATION. AN EXPERIMENT CONFIRMING THIS ANALYSIS WAS PERFORMED. A 2 MC/S FREQUENCY MODULATION WAS INTRODUCED INTO A CW GAAS INJECTION LASER WITH AN ULTRASONIC WAVE. THIS MODULATION WAS THEN DETECTED WITH THE USE OF A FABRY-PEROT INTERFEROMETER. A THEORETICAL ANALYSIS OF THE LIMITATIONS OF THE METHOD OF MODULATION DEMONSTRATED ABOVE WAS CARRIED OUT WITH A REGARD TO ITS DEVICE APPLICATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-643 606 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

LASER. (U)

NOV 66 20P ANG-JU,CHU ;
REPT. NO. FTD-TT-65-1453
MONITOR: TT 67-60190

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF TIEN TZU CHI SHU (CHINESE PEOPLE'S REPUBLIC) N3 P24-8 1964.

DESCRIPTORS: (*LASERS, CHINA), PROPAGATION, SCIENTIFIC RESEARCH, RUBY, GASES, MODULATION (U)

THE SIMILARITIES BETWEEN LIGHT AND ELECTROMAGNETIC WAVES ARE COMPARED. THE LASER OSCILLATOR IS DESCRIBED ALONG WITH LASER RADIATION. THE USE OF THE LASER IN SPACE RESEARCH, COMMUNICATION, MEDICINE, PHOTOGRAPHY, ETC., IS DESCRIBED. THE RUBY LASER AND A GASEOUS STATE LASER ARE DESCRIBED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-643 959 20/5 1/2 17/2 17/8
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

LASER LIGHT ADVANCES IN AVIATION. (U)

SEP 66 16P CHIN,YEN YOU ;
REPT. NO. FTD-TT-65-361

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF HANG K'UNG CHIH SHIH (CHINESE PEOPLE'S REPUBLIC) N7 P7-12 1964.

DESCRIPTORS: (*LASERS, AERONAUTICS), LIGHT COMMUNICATION SYSTEMS, OPTICAL TRACKING, OPDAR, OPTICAL EQUIPMENT, RANGE FINDING, CHINA (U)

THE ARTICLE EXAMINES LASER LIGHT ADVANCES IN THE FIELD OF AVIATION AND ITS APPLICATIONS IN COMMUNICATIONS, SEARCHING, TRACKING AND INTERCEPTION. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-645 640 9/4 17/2 20/5
DELAWARE UNIV NEWARK DEPT OF ELECTRICAL ENGINEERING

QUANTUM LIMITATIONS TO ELECTROMAGNETIC SIGNAL MEASUREMENTS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 66 20P BOLGIANO,L. PAUL ;
CONTRACT: AF-AFOSR-2-65
PROJ: AF-9768
TASK: 976802
MONITOR: AFOSR 67-0152

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-610 422.

DESCRIPTORS: (*QUANTUM STATISTICS, *INFORMATION THEORY), (*FIELD THEORY, *LIGHT COMMUNICATION SYSTEMS), ELECTROMAGNETIC WAVES, PHOTOELECTRIC EFFECT, LASERS, DETECTION (U)
IDENTIFIERS: PHOTODETECTION, OPTICAL COMMUNICATION SYSTEMS (U)

THE REPORT DESCRIBES WORK ON THE DEVELOPMENT OF AN EFFECTIVE STATISTICAL COMMUNICATION THEORY FOR OPTICAL COMMUNICATIONS. PHOTODETECTION STATISTICS HAVE BEEN COMPUTED FOR AN OPTICAL ILLUMINATION CONSISTING OF A CW SIGNAL AND NARROWBAND NOISE AND A FORMULA OBTAINED FOR THE INFORMATION TRANSMITTABLE BY AN OPTICAL DETECTOR. QUANTUM ELECTRODYNAMICS HAS BEEN USED TO EVALUATE THE STATISTICS OF A NARROWBAND OPTICAL COMMUNICATION SYSTEM AND TO COMPUTE THE STATISTICS OF A COUPLED MODE SYSTEM. THE REPORT SUMMARIZES THIS WORK AND LISTS PUBLICATIONS DURING THE GRANT PERIOD. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-649 851 20/6 20/10
BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS

QUANTUM THEORY OF INTERNALLY MODULATED LASERS. (U)

FEB 67 132P TITTERTON,PAUL J. ;
REPT. NO. SCIENTIFIC-4
CONTRACT: AF 19(628)-5833
PROJ: AF-4645
TASK: 464502
MONITOR: AFCRL 67-0119

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, MODULATION), (*AMPLITUDE MODULATION, LASERS), (*FREQUENCY MODULATION, LASERS), QUANTUM MECHANICS, RESONATORS, FIELD THEORY, GAIN, COHERENT RADIATION, THEORY, QUARTZ, POTASSIUM COMPOUNDS, PHOSPHATES, MODULATORS (U)
IDENTIFIERS: POTASSIUM DIHYDROPHATE (U)

RECENT EXPERIMENTS HAVE REVEALED TWO DISTINCT MODES OF OPERATION OF THE INTERNALLY MODULATED LASER, THE AM AND FM MODES, EACH OF WHICH REMOVES ALMOST ALL RANDOM PHASE AND AMPLITUDE FLUCTUATIONS IN THE LASER OUTPUT. A QUANTUM THEORY OF THE MODULATION PROCESS IS DEVELOPED IN TERMS OF THE TRAVELLING WAVE MODES OF AN OPTICAL RESONATOR. THE THEORY PREDICTS THE EFFECT OF THE MODULATOR ON AN ARBITRARY WAVE PACKET OF ELECTROMAGNETIC ENERGY. A SATURATION ANALYSIS OF THE STEADY STATE OPERATION OF BOTH THE AM AND THE FM LASER IS PERFORMED IN AN EFFECTIVE LINEAR RESPONSE APPROXIMATION. EFFECTIVE GAIN CURVES ARE FOUND AND PLOTTED FOR MULTIMODE AM, SINGLE MODE AM AND SINGLE MODE FM CASES. EXPERIMENTS ARE SUGGESTED TO TEST DETAILS OF THE MODULATION PROCESS WHOSE EFFECTS ARE REVEALED BY THIS ANALYSIS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-650 870 20/5
H NU SYSTEMS INC MENLO PARK CALIF

LASER PARAMETER MEASUREMENTS HANDBOOK. VOLUME I. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
FEB 67 387P HEARD,H. G. ;
CONTRACT: AF 30(602)-3346
PROJ: AF-5519
TASK: 551903
MONITOR: RADC TR-66-704-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-650 871, AD-650 872.

DESCRIPTORS: (*LASERS, HANDBOOKS), ELECTRICAL PROPERTIES, OPTICAL PROPERTIES, MEASUREMENT, COHERENT RADIATION, PROBES, TEST EQUIPMENT, ENERGY, POWER, CALORIMETRY, PHOTOCHEMISTRY, SPECTROSCOPY, REVIEWS (U)

THE HANDBOOK IS A COMPENDIUM OF MEASUREMENT THAT ENCOMPASSES THE LASER TECHNOLOGY. IT INCLUDES A WEALTH OF INFORMATION GLEANED FROM OVER 650 ARTICLES SURVEYED IN AN EXHAUSTIVE LITERATURE SEARCH THAT REVIEWED AMERICAN AS WELL AS FOREIGN SCIENTIFIC JOURNALS, AND GOVERNMENT REPORTS. THE WORK CONTAINS THE CONTRIBUTIONS OF 37 AUTHORS WHOSE WORKS WERE EDITED TO CONFORM WITH THE TEXT AND ABRIDGED TO ELIMINATE REDUNDANCY. IT IS BELIEVED THAT THE TEXT TREATS ALL OF THE SIGNIFICANT LASER MEASUREMENT TECHNIQUES THAT HAVE BEEN PUBLISHED TO DATE IN THE AREAS OF BEAM SAMPLING, BEAM PARAMETERS, POWER, ENERGY, GAIN, WAVELENGTH, BANDWIDTH, COHERENCE AND FREQUENCY STABILITY. THE TECHNIQUES OF MODULATION AND THE METHODS OF MEASUREMENT ARE TREATED AS ARE THE COMMUNICATION ASPECTS OF NOISE IN THE LASER SIGNAL SOURCE. THIS VOLUME CONTAINS CHAPTERS ENTITLED: LASER PARAMETERS AND MEASUREMENT; BEAM SAMPLING TECHNIQUES; MEASUREMENT OF BEAM PARAMETERS; MEASUREMENT OF ENERGY AND POWER. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-650 871 20/5
H NU SYSTEMS INC MENLO PARK CALIF

LASER PARAMETER MEASUREMENTS HANDBOOK. VOLUME II. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
FEB 67 235P HEARD,H. G. ;
CONTRACT: AF 30(602)-3346
PROJ: AF-5519
TASK: 551903
MONITOR: RADC TR-66-704-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-650 870, AD-650 872.

DESCRIPTORS: (*LASERS, HANDBOOKS), ELECTRICAL PROPERTIES, OPTICAL PROPERTIES, MEASUREMENT, COHERENT RADIATION, GAS LASERS, GAIN, PLASMA MEDIUM, ATOMIC ENERGY LEVELS, LINE SPECTRUM, TEST EQUIPMENT, MONOCHROMATIC LIGHT, SPECTROSCOPY, REVIEWS (U)

THE LASER PARAMETER MEASUREMENTS HANDBOOK IS A COMPENDIUM OF MEASUREMENT THAT ENCOMPASSES THE LASER TECHNOLOGY. IT INCLUDES A WEALTH OF INFORMATION GLEANED FROM OVER 650 ARTICLES SURVEYED IN AN EXHAUSTIVE LITERATURE SEARCH THAT REVIEWED AMERICAN AS WELL AS FOREIGN SCIENTIFIC JOURNALS, AND GOVERNMENT REPORTS. THIS WORK CONTAINS THE CONTRIBUTIONS OF 37 AUTHORS WHOSE WORKS WERE EDITED TO CONFORM WITH THE TEXT AND ABRIDGED TO ELIMINATE REDUNDANCY. IT IS BELIEVED THAT THE TEXT TREATS ALL OF THE SIGNIFICANT LASER MEASUREMENT TECHNIQUES THAT HAVE BEEN PUBLISHED TO DATE IN THE AREAS OF BEAM SAMPLING, BEAM PARAMETERS, POWER, ENERGY, GAIN, WAVELENGTH, BANDWIDTH, COHERENCE AND FREQUENCY STABILITY. THE TECHNIQUES OF MODULATION AND THE METHODS OF MEASUREMENT ARE TREATED AS ARE THE COMMUNICATION ASPECTS OF NOISE IN THE LASER SIGNAL SOURCE. THIS VOLUME CONTAINS CHAPTERS ENTITLED: MEASUREMENT OF GAIN PARAMETERS; MEASUREMENT OF WAVELENGTH. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-650 872 20/5
H NU SYSTEMS INC MENLO PARK CALIF

LASER PARAMETER MEASUREMENTS HANDBOOK. VOLUME III. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
FEB 67 296P HEARD,H. G. ;
CONTRACT: AF 30(602)-3346
PROJ: AF-5519
TASK: 551903
MONITOR: RADC TR-66-704-VOL-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-650 870, AD-650 871.

DESCRIPTORS: (*LASERS, HANDBOOKS), ELECTRICAL PROPERTIES, OPTICAL PROPERTIES, MEASUREMENT, COHERENT RADIATION, BANDWIDTH, LINE SPECTRUM, FLUORESCENCE, DOPPLER EFFECT, GAIN, GAS LASERS, INTERFEROMETERS, STABILITY, NOISE, MODULATION, PHOTONS, REVIEWS (U)

THE HANDBOOK IS A COMPENDIUM OF MEASUREMENT THAT ENCOMPASSES THE LASER TECHNOLOGY. IT INCLUDES A WEALTH OF INFORMATION GLEANED FROM OVER 650 ARTICLES SURVEYED IN AN EXHAUSTIVE LITERATURE SEARCH THAT REVIEWED AMERICAN AS WELL AS FOREIGN SCIENTIFIC JOURNALS, AND GOVERNMENT REPORTS. THIS WORK CONTAINS THE CONTRIBUTIONS OF 37 AUTHORS WHOSE WORKS WERE EDITED TO CONFORM WITH THE TEXT AND ABRIDGED TO ELIMINATE REDUNDANCY. IT IS BELIEVED THAT THE TEXT TREATS ALL OF THE SIGNIFICANT LASER MEASUREMENT TECHNIQUES THAT HAVE BEEN PUBLISHED TO DATE IN THE AREAS OF BEAM SAMPLING; BEAM PARAMETERS; POWER, ENERGY, GAIN, WAVELENGTH, BANDWIDTH, COHERENCE AND FREQUENCY STABILITY. THE TECHNIQUES OF MODULATION AND THE METHODS OF MEASUREMENT ARE TREATED AS ARE THE COMMUNICATION ASPECTS OF NOISE IN THE LASER SIGNAL SOURCE. THIS VOLUME CONTAINS CHAPTERS ENTITLED: MEASUREMENT OF BANDWIDTH AND COHERENCE; MEASUREMENT OF FREQUENCY STABILITY; MEASUREMENT OF NOISE AND MODULATION OF LASER CARRIERS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-653 962 17/2 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

RAY PENETRATING INTO THE FUTURE ULTRADISTANT COSMIC COMMUNICATION LIGHT PULSES OF SATELLITES. (U)

FEB 67 13P ALEKSANDROV,N. ;
REPT. NO. FTD-HT-66-439
MONITOR: TT 67-62146

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LUCH, PRONIKAYUSHCHII V BUDUSHCHEE ... , UNEDITED ROUGH DRAFT TRANS. OF NAUCHNO-TEKHNICHESKIE OBSHCHESTVA SSSR, V6 N8 P41-3 1964.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, *LASERS), SEMICONDUCTORS, GALLIUM ARSENIDES, RELATIVITY THEORY, SPACE COMMUNICATION SYSTEMS, SATELLITES(ARTIFICIAL) (U)

THE LENIN PRIZE FOR 1964 WAS PRESENTED TO ASSOCIATE MEMBER OF THE AN SSSR BENTSION VUL AND A LARGE GROUP OF COWORKERS FOR THE DEVELOPMENT OF A GALLIUM-ARSENIDE SEMICONDUCTOR LASER. THE SEMICONDUCTOR LASER IS ALMOST 100% EFFICIENT AND ITS MICROMINIATURE SIZE HOLDS GREAT PROMISE FOR USE IN COMPUTERS TO ACHIEVE SPEEDS OF TENS OF BILLIONS OF OPERATIONS PER SECOND. DIRECT COMMUNICATION OVER DISTANCES OF SEVERAL LIGHT YEARS IS CONSIDERED POSSIBLE WITH THE USE OF LASERS. SATELLITES CARRYING A LASER COULD BE EASILY SEEN AND ACCURATELY TRACKED BOTH DAY AND NIGHT. APPLICATIONS OF LASERS IN RADIO, TELEPHONE AND TELEVISION COMMUNICATIONS AND IN CHEMISTRY ARE MENTIONED. QUANTUM TECHNIQUES MAKE POSSIBLE A CONSTRUCTION OF CLOCKS ACCURATE TO ONE SECOND IN TEN THOUSAND YEARS WHICH COULD BE USED TO CONDUCT RELATIVITY EXPERIMENTS. USE OF THE LASER BEAM AS A METAL WORKING AND SURGICAL TOOL IS MENTIONED. LONG DISTANCE, HIGH-EFFICIENCY TRANSMISSION OF ENERGY BY LASER BEAM, ESPECIALLY IN SPACE WHERE THE ABSORBING AND SCATTERING EFFECTS OF THE ATMOSPHERE ARE AVOIDED, IS CONSIDERED ABSOLUTELY ESSENTIAL IN THE CONQUEST OF SPACE. DIRECT CONVERSION OF MATTER INTO ENERGY WITHOUT EXPLOSION IS POSSIBLE USING QUANTUM DEVICES. QUANTUM ENGINES MAY UTILIZE SOLAR ENERGY DURING SPACE FLIGHT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-655 119 17/2 20/10 20/5
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ELECTRICAL ENGINEERING

A QUANTUM STATISTICAL ANALYSIS OF A FREQUENCY MODULATED LASER COMMUNICATION SYSTEM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 67 86P RUGGIERI,NEIL F. ;
CONTRACT: DA-31-124-ARO(D)-383
PROJ: DA-20014501B31E
MONITOR: AROD 5659:3-E

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, LASERS), (*LASERS, *QUANTUM STATISTICS), FREQUENCY MODULATION, OSCILLATORS, DEMODULATION, PROBABILITY DENSITY FUNCTIONS, SIGNAL-TO-NOISE RATIO (U)

IN THIS ANALYSIS THE QUANTUM STATISTICS OF THE RECEIVED SIGNAL OF A FREQUENCY MODULATED LASER COMMUNICATION SYSTEM ARE DERIVED. IN PARTICULAR THE DETECTION STATISTICS FOR HETERODYNE AND ELECTRIC FIELD DETECTION OF THE FREQUENCY MODULATED LASER BEAM ARE DETERMINED. THESE DETECTION STATISTICS ARE USED TO DEFINE A MEASURE OF THE COMMUNICATION SYSTEM PERFORMANCE IN TERMS OF A SIGNAL TO NOISE RATIO. THE DEVELOPMENT OF THE QUANTUM ELECTROMAGNETIC FIELD IN TERMS OF THE PHOTON ANNIHILATION EIGENSTATES IS THE BASIS FOR DETERMINING THESE STATISTICS. THE DERIVATION USED ACCOUNTS FOR FLUCTUATIONS IN THE CARRIER, FLUCTUATIONS DUE TO BACKGROUND RADIATION INTRODUCED AFTER MODULATION, FLUCTUATIONS DUE TO THE LOCAL LASER OSCILLATOR, AND ZERO POINT FIELD FLUCTUATIONS. THE RESULTS OF THIS ANALYSIS INDICATE THE PROBABILITY DISTRIBUTION FOR THE OPTICAL HETERODYNE DETECTION IS NOT A FAMILIAR ONE OF CLASSICAL COMMUNICATION THEORY, BUT IT IS OF THE FORM OF PROBABILITY DISTRIBUTION THAT SATISFIES EXPERIMENTALLY MEASURED PHOTOCOUNT STATISTICS OF UNMODULATED LASER RADIATION. THE PROBABILITY DISTRIBUTION FOR THE ELECTRIC FIELD INTENSITY DETECTION OF THE FREQUENCY MODULATED LASER BEAM IS THE FAMILIAR GAUSSIAN DISTRIBUTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-655 774 20/5 17/2 17/8 13/8
14/5

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS

A BIBLIOGRAPHY OF LASER APPLICATIONS. (U)

DESCRIPTIVE NOTE: SPECIAL REPORTS NO. 62,
APR 67 46P STICKLEY,C. MARTIN ;
GINGRANDE,ARTHUR ;
REPT. NO. AFCRL-67-0223
PROJ: AF-4645
TASK: 464502

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, BIBLIOGRAPHIES), MEASUREMENT, LIGHT COMMUNICATION SYSTEMS, OPDAR, INSTRUMENTATION, CHEMISTRY, PHOTOGRAPHY, MATERIAL FORMING (U)

THE BIBLIOGRAPHY OF LASER APPLICATIONS CONTAINS 644 ENTRIES FROM THE OPEN LITERATURE FOR THE PERIOD 1961 THROUGH SEPTEMBER 1966. THE ENTRIES ARE DIVIDED INTO THE FOLLOWING MAJOR AREAS: MECHANICAL MEASUREMENTS AND STANDARDS; COMMUNICATIONS APPLICATIONS; RADAR AND TRACKING APPLICATIONS; MILITARY APPLICATIONS; OPTICAL SIGNAL PROCESSING; INTERFEROMETRY AND TESTING OF OPTICAL COMPONENTS; APPLICATIONS TO SCIENTIFIC STUDIES; APPLICATIONS IN CHEMISTRY; PHOTOGRAPHIC APPLICATIONS; METALWORKING; AND MISCELLANEOUS APPLICATIONS. THE ENTRIES ARE FURTHER SUBDIVIDED INTO 78 OTHER CATEGORIES. APPLICATIONS IN MEDICAL AND BIOLOGICAL RESEARCH ARE NOT INCLUDED; COMPLETE COVERAGE IN THE OTHER AREAS IS NOT GUARANTEED. UNDER SOME TOPICS (DETECTION TECHNIQUES, SPECTROSCOPY, INTERACTION WITH ACOUSTIC WAVES, PLASMA DIAGNOSTICS, NONLINEAR OPTICS, GAS BREAKDOWN, SCATTERING, HOLOGRAPHY) SO MUCH HAS BEEN PUBLISHED THAT ONLY REVIEW ARTICLES, ARTICLES OF MAJOR IMPORTANCE, AND VERY RECENT ARTICLES COULD BE INCLUDED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-658 175 20/5
TRG INC MELVILLE N Y

MULTI-MODE HIGH ENERGY LASER TRANSMITTER. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
AUG 67 95P POGODA,A. L. ;MCGUIRE,J. N. ;
REPT. NO. TRG-086-IR-1
CONTRACT: AF 33(615)-3888

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *TRANSMITTER-RECEIVERS), RUBY, ENERGY, Q METERS, AMPLIFIERS, DESIGN, OPERATION, BORESIGHTING, SERVOMECHANISMS, TELESCOPES, MULTIPLE OPERATION (U)

THE REPORT OUTLINES THE PROGRESS MADE TOWARD COMPLETION OF THE MULTI-MODE HIGH ENERGY LASER TRANSMITTER SYSTEM (MMHELTS) IN THE PERIOD FROM 6 SEPTEMBER 1966 THROUGH 15 MAY 1967. IN ADDITION, IT DISCUSSES DESIGN CHANGES REQUIRED FOR ENHANCEMENT OF THE OPERATION OF THE EQUIPMENT IN THE FIELD. AREAS WHICH TRG BELIEVE TO BE NECESSARY ADDITIONS AND/OR LOGICAL IMPROVEMENTS TO THE OPERATIONAL CAPABILITY OF THE OVERALL SYSTEM ARE DISCUSSED IN DETAIL. THE OVERALL CONFIGURATION OF THE HIGH ENERGY SYSTEM HAS NOT BEEN CHANGED FROM THAT IN THE DESIGN EXHIBIT, SUBMITTED TO WRIGHT-PATTERSON AIR FORCE BASE ON 1 SEPTEMBER 1966. THE RUBY LENGTH OF THE Q-SWITCHED SYSTEM, HOWEVER, HAS BEEN REDUCED TO A TOTAL OF 17 INCHES. THE OVERALL LENGTH HAS BEEN DIVIDED INTO ONE BREWSTER'S ANGLED 4 IN. Q-SWITCHED OSCILLATOR FOLLOWED BY 13 IN. OF ACTIVE AMPLIFIER. THE 13 IN. AMPLIFIER SECTION CONSISTS OF A 4 IN. CAVITY FOLLOWED BY A 9 IN. CAVITY BOTH OF WHICH ARE BREWSTER'S ANGLED. ALL RUBY RODS WILL REMAIN 15MM IN DIAMETER. THE STATUS OF THE DYNAMIC BORESIGHTING SYSTEM DEVELOPMENT EFFORT IS ALSO DISCUSSED HEREIN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-658 382 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

LASERS IN SPACE, ON THE EARTH, AND UNDER WATER, (U)

APR 67 92P CHERNYSHEV,V. N. ;
REPT. NO. FTD-MT-65-373
MONITOR: TT 67-62867

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO. LAZERY V KOSMOSE; NA ZEMLE I POD VODOI, MOSCOW, 1964 P1-104.

DESCRIPTORS: (*LASERS, OPTICAL EQUIPMENT), PARTICLE BEAMS, DESIGN, QUANTUM MECHANICS, GENERATORS, DETECTION, AMPLIFIERS, ENERGY, GAS LASERS, COMMUNICATION SYSTEMS, NAVIGATION, UNDERWATER, FIBER OPTICS, USSR (U)

THE WORKING PRINCIPLES ARE CONSIDERED OF QUANTUM-MECHANICAL GENERATORS AND AMPLIFIERS OF OPTICAL RANGE-LASERS. LASER DEVICES OF DIFFERENT TYPES AND ASSIGNMENTS ARE DISCUSSED. LASER RADIATION (ABROAD THEY ARE SOMETIMES CALLED 'DEATH RAYS') CAN BE USED NOT ONLY AS A WEAPON OF DESTRUCTION, BUT ALSO AS A MEANS OF SUPER-RANGE COMMUNICATION, DETECTION, AND NAVIGATION. THE PAMPHLET GENERALIZES EXTENSIVE BUT SEPARATED MATERIAL PUBLISHED IN DOMESTIC AND FOREIGN PERIODIC PRESS. THE WORK IS DESIGNED FOR READERS WITH SECONDARY EDUCATION, FAMILIAR WITH THE BASES OF RADIO ENGINEERING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-659 738 20/5 20/6 20/12
TEXAS UNIV AUSTIN LABS FOR ELECTRONICS AND RELATED SCIENCE RESEARCH

A UNIQUE LASER DETECTOR UTILIZING THE PHOTODIELECTRIC EFFECT IN COOLED SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
SEP 67 175P STONE,JACKIE L. ;HARTWIG, WILLIAM H. ;
REPT. NO. TR-39
CONTRACT: AF-AFOSR-766-67
PROJ: AF-4751
MONITOR: AFOSR 67-2138

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *DETECTORS), (*COMMUNICATION EQUIPMENT, LASERS), (*SEMICONDUCTORS, LASERS), ELECTROOPTICS, PHOTOCONDUCTIVITY, GERMANIUM, PHOTOELECTRIC MATERIALS, DIELECTRIC PROPERTIES, RELAXATION TIME, LIGHT, RESONANT FREQUENCY, SENSITIVITY, BANDWIDTH, SPECTRA(INFRARED), SPACE COMMUNICATION SYSTEMS (U)

A CHANGE IN THE REAL PART OF THE DIELECTRIC CONSTANT OF SEMICONDUCTORS IS OBSERVABLE AT 4.2K. THE DIELECTRIC PERTURBATION CAN BE OPTICALLY INDUCED AND SUBSEQUENTLY USED TO VARY THE RESONANT FREQUENCY OF A HIGH Q, SUPERCONDUCTING RE-ENTRANT CAVITY. THE FREQUENCY CHANGES ARE PREDICTABLE FROM A CLASSICAL TREATMENT OF THE COMPLEX DIELECTRIC CONSTANT IN THE PRESENCE OF OPTICAL AND THERMAL CARRIERS. A TRANSMISSION LINE EQUIVALENT CIRCUIT IS USED TO ACCURATELY PREDICT THE BEHAVIOR OF A PHOTODIELECTRIC DETECTOR. THE IMPORTANT PARAMETERS WHICH AFFECT THE PERFORMANCE OF THE DETECTOR ARE THE FREE CARRIER RELAXATION TIME, RECOMBINATION LIFETIME, THE UNLOADED CAVITY RESONANT FREQUENCY, SAMPLE THICKNESS, AND THE CAPACITIVE LOADING EFFECTS. THESE ARE REFERRED TO AS THE SENSITIVITY PARAMETERS. THE ULTIMATE FREQUENCY RESPONSE (I.E. THE RATE AT WHICH THE FREQUENCY CAN BE VARIED) IS SHOWN TO BE LIMITED BY THE FREE CARRIER LIFETIME IN THE SEMICONDUCTOR SAMPLE. THE PHOTODIELECTRIC RECEIVER IS USED IN THE DESIGN OF AN OPTICAL COMMUNICATIONS SYSTEM WHICH WAS USED TO DETECT VIDEO RATE, AMPLITUDE MODULATION OF A 9000A INFRARED LIGHT SOURCE. THREE SUCH SYSTEMS ARE DESCRIBED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-664 197 9/5 20/12
CALIFORNIA UNIV LOS ANGELES DEPT OF ENGINEERING

RESEARCH ON SOLID STATE HETERODYNE DETECTORS FOR ULTRASTABLE OPTICAL SOURCES. (U)

DESCRIPTIVE NOTE: ANNUAL REPT. 15 JUN 66-15 JUN 67,
DEC 67 18P VISWANATHAN,C. R. ;
REPT. NO. 67-57
CONTRACT: DA-28-043-AMC-02341(E)
PROJ: DA-1H6-22001-A-056
TASK: 1H6-22001-A-056-03
MONITOR: ECOM 02341-2

UNCLASSIFIED REPORT

DESCRIPTORS: (*DEMODULATORS, SEMICONDUCTOR DEVICES), PHOTOELECTRIC EFFECT, SILICON, SILICON DIOXIDE, GOLD, BAND THEORY OF SOLIDS, RHENIUM, TUNGSTEN, MOLYBDENUM, OPTICAL EQUIPMENT, LASERS (U)
IDENTIFIERS: OPTICAL DETECTORS, METAL OXIDE SEMICONDUCTORS (U)

PHOTO EMISSION FROM SOLID TO SOLID IN MOS STRUCTURES HAS BEEN STUDIED IN A SILICON-SILICONOXIDE-GOLD STRUCTURE. THIS STUDY GAVE INSIGHT INTO THE LOCATION OF THE SILICON DIOXIDE CONDUCTION BAND WITH RESPECT TO THE SILICON ENERGY BANDS. IT WAS ALSO FOUND THAT THE NUMBER OF TRAPS IS HIGHER IN P SAMPLES THAN IN N SAMPLES. PHOTOEMISSION FROM SOLIDS INTO VACUUM WAS STUDIED AND THE METHOD OF PERIODIC SCHOTTKY DEVIATION HAS BEEN USED AS A TOOL FOR EVALUATING SURFACE BARRIERS OF METALS. BY USING PHASE MATCHING INSTEAD OF AMPLITUDE MATCHING BETWEEN THE PREDICTED CURVE AND THE EXPERIMENTAL CURVE A BARRIER HEIGHT OF 7.4, 6.1 AND 5.2 E V FOR RHENIUM, TUNGSTEN, AND MOLYBDENUM WAS OBTAINED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-665 584 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

LASER WITH MAXIMUM DEEP MODULATION OF RESONATOR QUALITY, (U)

AUG 67 10P STARUNOV,M. H. ;EROMKA,V. D. ;BONCHKOVSKII,V. Y. ;
REPT. NO. FTD-HT-66-554

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF UKRAYINSKYI FIZYCHNYI ZHURNAL (USSR), V11 N2 P217-8 1966.

DESCRIPTORS: (*LASERS, USSR), OPTICAL PROPERTIES, MODULATION, RESONATORS, CRYSTALS, RUBY, DIELECTRIC FILMS, RODS (U)
IDENTIFIERS: Q-SWITCHING, TRANSLATIONS (U)

IN EARLIER EXPERIMENTS Q SWITCHING WAS USUALLY EFFECTED BY INTERRUPTING THE COUPLING BETWEEN THE ACTIVE ROD AND ONLY ONE RESONATOR MIRROR; THE REPORT INVESTIGATES THE PROPERTIES OF A LASER IN WHICH THE COUPLING WITH BOTH MIRRORS IS INTERRUPTED. AN ESTIMATE SHOWS THAT THE GAIN CAN BE INCREASED IN THIS CASE TO ALMOST THE THEORETICAL 50%. TWO VARIANTS OF SUCH A LASER WERE TESTED. TWO RUBY CRYSTALS EACH 24 CM LONG AND 1.25 CM IN DIAMETER WERE USED. ONE CRYSTAL OPERATED IN THE Q-SWITCHING MODE. THE ENDS OF THE CRYSTALS AND THE HYPOTENUSE FACES OF THE TOTAL-REFLECTION PRISMS WERE COATED WITH MGF2 AND CAF2 FILMS, RESPECTIVELY. THE RESONATOR COMPRISED ALTERNATING DIELECTRIC COATINGS OF CAF2 AND ZNS ON PLATE GLASS AND THE PRISM. THE PLATE WAS ROTATED AT 12,000 RPM. THE FOCUSED GIANT PULSE PRODUCED BREAKDOWN IN AIR. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-666 434 20/5
ILLINOIS UNIV URBANA ANTENNA LAB

COHERENCE OF LASER RADIATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
DEC 67 54P BAYAZIT,YASAR NABI ;
REPT. NO. TR-14, UIAL-67-9
CONTRACT: AF 19(628)-3819
PROJ: AF-5635
TASK: 563502
MONITOR: AFCRL 68-0035

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *COHERENT RADIATION), INTERFEROMETERS, LIGHT TRANSMISSION, MONOCHROMATIC LIGHT, PHOTOMULTIPLIERS, HELIUM, NEON, OPTICAL PROPERTIES (U)
IDENTIFIERS: FABRY-PEROT RESONATORS (U)

THIS REPORT IS INTENDED TO BE A STUDY OF SOME OF THE ASPECTS OF THE COHERENCE PROPERTIES OF OPTICAL FIELDS AS THEY PROPAGATE THROUGH CERTAIN TYPE OF MEDIA. A MAJOR PART OF THIS REPORT DEALS WITH THE RESPONSE OF A FABRY-PEROT RESONATOR TO VARIOUS TYPES OF EXCITATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-668 713 20/6
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

INFRARED HETERODYNE DETECTION. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,
OCT 67 11P TEICH,MALVIN C. ;
REPT. NO. JA-3078
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-68-45

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE IEEE, V56 N1 P37-46 JAN 1968.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 10 AUG 67.

DESCRIPTORS: (*INFRARED RADIATION, DETECTION), GAS LASERS, IRASERS, CARBON DIOXIDE, INFRARED DETECTORS, INFRARED PHOTOCONDUCTORS, PHOTODIODES, CRYOGENICS, OPDAR, INFRARED COMMUNICATION SYSTEMS, INFRARED SPECTROSCOPY, OPTIMIZATION (U)
IDENTIFIERS: *HETERODYNE DETECTION, INFRARED RADAR (U)

HETERODYNE EXPERIMENTS HAVE BEEN PERFORMED IN THE MIDDLE INFRARED REGION OF THE ELECTROMAGNETIC SPECTRUM USING THE CO2 LASER AS A RADIATION SOURCE. THEORETICALLY OPTIMUM OPERATION HAS BEEN ACHIEVED AT KHZ HETERODYNE FREQUENCIES USING PHOTOCONDUCTIVE GE:CU DETECTORS OPERATED AT 4K, AND AT KHZ AND MHZ FREQUENCIES USING PHOTOVOLTAIC DETECTORS AT 77K. IN ACCORDANCE WITH THE THEORY, THE MINIMUM DETECTABLE POWER OBSERVED IS A FACTOR OF 2/ETA GREATER THAN THE THEORETICALLY PERFECT QUANTUM COUNTER. THE COEFFICIENT 2/ETA VARIES FROM 5 TO 25 FOR THE DETECTORS INVESTIGATED IN THIS STUDY. A COMPARISON IS MADE BETWEEN PHOTOCONDUCTIVE AND PHOTODIODE DETECTORS FOR HETERODYNE USE IN THE INFRARED, AND IT IS CONCLUDED THAT BOTH ARE USEFUL. HETERODYNE DETECTION AT 10.6 MICROMETERS IS EXPECTED TO BE USEFUL FOR COMMUNICATIONS APPLICATIONS, INFRARED RADAR, AND HETERODYNE SPECTROSCOPY. IT HAS PARTICULAR SIGNIFICANCE BECAUSE OF THE HIGH RADIATION POWER AVAILABLE FROM THE CO2 LASER, AND BECAUSE OF THE 8 TO 14 MICROMETER ATMOSPHERIC WINDOW. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-669 086 17/5 20/5
ILLINOIS UNIV URBANA GASEOUS ELECTRONICS LAB

DYNAMICS OF OPTICAL MIXING IN A HE-NE LASER, (U)

FEB 68 42P MILLER,P. S. ;CHERRINGTON, B. E. ;VERDEYEN,J. T. ;

CONTRACT: AF 33(615)-5248
PROJ: AF-7073
TASK: 707303
MONITOR: ARL 68-0033

UNCLASSIFIED REPORT

DESCRIPTORS: (*INFRARED DETECTORS, GAS LASERS), (*GAS LASERS, ATOMIC ENERGY LEVELS), HELIUM, NEON, BANDWIDTH, AMPLITUDE MODULATION, EXCITATION, RESPONSE, PERTURBATION THEORY, MATHEMATICAL PREDICTION (U)
IDENTIFIERS: OPTICAL MIXING, RESPONSE TIME, COMPUTER ANALYSIS (U)

THE DIFFERENCE FREQUENCY BETWEEN TWO 3.39 MICRON SIGNALS INJECTED INTO A 6328 A AND/OR 1.15 MICRON HE-NE LASER HAS BEEN DETECTED AS AN AMPLITUDE MODULATION OF THE 6328 A AND/OR 1.15 MICRON OUTPUT INTENSITY. EXPERIMENTAL MEASUREMENTS OF THE BANDWIDTH OF THIS DETECTION SCHEME HAVE BEEN MADE FOR A 6328 A LASER DETECTOR. IT IS SHOWN THAT THE FUNDAMENTAL EQUATIONS OF LASER ACTION PROPERLY PREDICT THE BEHAVIOR OF THE LASER DETECTOR AND INDICATE THE OPERATING CONDITIONS WHICH ARE NECESSARY IN ORDER TO ACHIEVE OPTIMUM BANDWIDTH. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-669 305 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

LIGHT - DETECTOR AND WEAPON, (U)

NOV 67 92P KRASNOV,V. ;
REPT. NO. FTD-HT-23-809-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF MONO. SVET - LOKATOR, SVET - ORUZHIE, MOSCOW, 1964 P1-103.

DESCRIPTORS: (*LASERS, USSR), QUANTUM MECHANICS, VISIBILITY, COHERENT RADIATION, INSTRUMENTATION, RUBY, PULSE SYSTEMS, GAS LASERS, PUMPING(OPTICAL), DEMODULATION, MARS(PLANET), COMMUNICATION EQUIPMENT, GYROSCOPES, PREDICTIONS (U)

A BEAM OF LIGHT FROM A QUANTUM GENERATOR IS A MILLION TIMES BRIGHTER THAN THE SUN AT THE SAME SOLID ANGLE. HAVING A HIGH CONCENTRATION OF ENERGY, THE BEAM OF A QUANTUM GENERATOR CAN EASILY PIERCE A THICK METAL PLATE, EVEN A DIAMOND. FOCUSED INTO A NEEDLE BEAM, THE WEAPON BECOMES A DEADLY WEAPON. USING THE BEAMS OF A QUANTUM GENERATOR, DIRECT COMMUNICATION WITH THE PLANETS AND THE STARS CAN BE ACHIEVED. SUCCESSFUL EXPERIMENTS WITH LIGHT-COMMUNICATIONS HAVE BEEN CONDUCTED ON EARTH. QUANTUM GENERATORS CAN BE USED ALSO AS OPTICAL LOCATORS. IN RANGE AND ACCURACY THEY ARE FAR BETTER THAN RADAR. IN 1962 OPTICAL DETECTION OF THE MOON WAS MADE. IT BECAME POSSIBLE TO EXAMINE IN DETAIL THE LUNAR SURFACE AND, IN THE FUTURE, OTHER PLANETS OF THE SOLAR SYSTEM. THE TREMENDOUS DENSITY OF THE ENERGY OF THE NEW BEAMS PERMIT THEIR WIDE USE IN VARIOUS TECHNOLOGIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-670 120 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

QUANTUM RADIOPHYSICS: SELECTED ARTICLES. (U)

SEP 67 87P
REPT. NO. FTD-MT-67-31

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF AKADEMIYA NAUK SSSR. FIZICHESKII INSTITUT. TRUDY, V31 P74-112, 139-77 1965.

DESCRIPTORS: (*LASERS, REPORTS), ATOMIC ENERGY LEVELS, LIGHT COMMUNICATION SYSTEMS, GAS LASERS, MASERS, PULSE SYSTEMS, MOLECULAR BEAMS, HYDROGEN, RUBY, EXCITATION, COHERENT RADIATION, USSR (U)
IDENTIFIERS: TRANSLATIONS, QUANTUM ELECTRONICS, ATOMIC BEAMS, COMPUTER ANALYSIS, FREQUENCY STANDARDS (U)

CONTENTS: REGENERATIVE OPTICAL QUANTUM AMPLIFIERS; CONDITIONS OF PULSATIONS OF EMISSION POWER OF QUANTUM GENERATORS; QUESTIONS OF CONSTRUCTION AND INVESTIGATION OF WORK OF QUANTUM GENERATOR ON BEAM OF HYDROGEN ATOMS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-671 596 17/2 20/5
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

FREQUENCY-SHIFT KEYING LASER COMMUNICATION STUDIES. (U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,
APR 68 144P SMITH,DONALD A. ;
REPT. NO. ECOM-2967
PROJ: DA-1L0-13001-A91A
TASK: 1L0-13001-A91A-56

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, GAS LASERS), (*GAS LASERS, *FREQUENCY SHIFT KEYERS), (*MODULATORS, GAS LASERS), HELIUM, NEON, DIGITAL SYSTEMS, FREQUENCY MODULATION, ELECTROOPTICS, POTASSIUM COMPOUNDS, BIREFRINGENCE, POLARIZATION, MATRIX ALGEBRA, SIGNAL-TO-NOISE RATIO, DIAGRAMS, THESES (U)
IDENTIFIERS: POTASSIUM DIHYDROPHOSPHATE, *LASER MODULATORS (U)

A UNIQUE OPTICAL MODULATION AND DETECTION TECHNIQUE HAS EVOLVED FROM AN INVESTIGATION OF METHODS OF DIGITAL MODULATION, TRANSMISSION, AND DETECTION IN THE OPTICAL REGION. IN PARTICULAR A FREQUENCY-SHIFT KEYING LASER COMMUNICATION SYSTEM HAS BEEN DEMONSTRATED AND THE ADVANTAGES OF SUCH A SYSTEM HAVE BEEN SHOWN. A DETAILED THEORETICAL ANALYSIS OF ELECTROMAGNETIC-WAVE PROPAGATION IN AN ELECTROOPTIC CRYSTAL OF ARBITRARY ORIENTATION WAS DEVELOPED. IN TURN THE PARAMETERS FOR AN OPTICAL MODULATOR CAPABLE OF FREQUENCY-SHIFT KEYING AT A DIGITAL RATE WERE DETERMINED. BASED ON THIS ANALYSIS A LABORATORY COMMUNICATION SYSTEM INCORPORATING FSK MODULATION AND DETECTION CAPABILITIES WAS BUILT AND SUCCESSFULLY OPERATED. THE TRANSMITTER CONSISTS OF TWO HELIUM-NEON GAS LASERS OPERATING AT WAVELENGTHS OF 6328 ANGSTROMS AND 11523 ANGSTROMS. THE TWO BEAMS ARE COMBINED AND PASS THROUGH THE KDP ELECTRO-OPTIC MODULATOR WHICH IS DRIVEN BY A DIGITAL VOLTAGE OF 100 VOLTS PEAK AMPLITUDE. THE RECEIVER CONSISTS OF TWO PHOTODIODES, EACH DETECTING ONE OF THE WAVELENGTHS. THE DETECTED SIGNALS ARE PROCESSED BY DECISION CIRCUITRY TO RETRIEVE THE TRANSMITTED INFORMATION. TO EVALUATE THE PERFORMANCE OF AN OPTICAL FSK SYSTEM, ERROR RATE MEASUREMENTS WERE MADE IN A SIMULATED ATMOSPHERIC TYPE OF ENVIRONMENT AND COMPARED TO SIMILAR MEASUREMENTS MADE (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-672 301 17/2 20/6
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J INST FOR EXPLORATORY RESEARCH

SELF-ALIGNING OPTICAL BEAM WAVEGUIDES, (U)

67 6P CHRISTIAN,J. ROBERT ;GOUBAU, GEORG ;MINK,J. W. ;

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN IEEE JNL. OF QUANTUM ELECTRONICS, VQE3 N11 P498-503 NOV 1967.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, WAVEGUIDES), (*LENSES, ALIGNMENT), LASERS, OPTICAL COATINGS, CONTROL SYSTEMS, TOLERANCES(MECHANICS), SEISMOLOGY (U)
IDENTIFIERS: QUANTUM ELECTRONICS, AUTOMATIC CONTROL SYSTEMS, COMPUTER ANALYSIS (U)

PREVIOUS EXPERIMENTS WITH A LENS-TYPE BEAM WAVEGUIDE HAVE DEMONSTRATED THE APPLICABILITY OF SUCH GUIDES TO EFFICIENT LONG DISTANCE TRANSMISSION AT OPTICAL FREQUENCIES. IN PRACTICAL APPLICATIONS IT WILL BE NECESSARY TO AUTOMATICALLY COMPENSATE FOR MOVEMENTS OF THE GROUND WHICH WOULD MISALIGN THE GUIDE AND THUS CAUSE INCREASED TRANSMISSION LOSS. IN ORDER TO INVESTIGATE THE PRACTICABILITY OF 'SELF-ALIGNING' OPTICAL BEAM WAVEGUIDES THE AVAILABLE EXPERIMENTAL GUIDE WAS MODIFIED BY ADDING A SENSING DEVICE AT EACH LENS WHICH INDICATES ANY DISPLACEMENT OF THE BEAM FROM THE LENS CENTER. THIS ALIGNMENT ACCURACY COULD BE GREATLY INCREASED, WHICH MIGHT BE OF INTEREST FOR GEOLOGICAL MEASUREMENTS CONCERNING MOVEMENTS IN THE EARTH'S CRUST. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-672 693 20/6 20/5 17/2
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

INVESTIGATION AND DEVELOPMENT OF OPTICAL MODULATORS (ISSLEDOVANIE I RAZRABOTKA OPTICHESKIKH MODULYATOROV). (U)

OCT 67 12P PIRSHIN,I. V. ;KOBLOVA,M. M. ;KHLYSTOV,V. I. ;ANTONYANTS,E. V. ;
REPT. NO. FT-MT-24-222-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONG. VSESOYUZNAYA NAUCHNAYA SESSIYA, POSVYASCHENNAYA DNYU RADIO (NO. 22): SEKTSIYA KVANTOVOI ELEKTRONIKI (SCIENTIFIC AND TECHNICAL SOCIETY OF RADIO ENGINEERING AND ELECTRICAL COMMUNICATION. CENTRAL GOVERNMENT 22 ALL-UNION SCIENTIFIC SESSION, DEDICATED TO RADIO DAY. SECTION OF QUANTUM (ELECTRONICS), MOSCOW, 1966 P33-40.

DESCRIPTORS: (*LASERS, *MODULATORS), (*LIGHT COMMUNICATION SYSTEMS, MODULATORS), INTERFEROMETERS, CRYSTALS, POTASSIUM COMPOUNDS, PHOSPHATES, POWER, OPTIMIZATION, THERMAL EXPANSION, MODULATION, TELEVISION COMMUNICATION SYSTEMS, USSR (U)

IDENTIFIERS: *OPTICAL MODULATORS, *LASER COMMUNICATION SYSTEMS, ELECTRO-OPTICAL SYSTEMS, TRANSLATIONS (U)

A DEVICE USING A SYMMETRICAL MICHAILSON INTERFEROMETER WITH DOUBLE REFRACTING DIAGONALLY CUT CRYSTALS IN THE ARMS WAS DEVELOPED. THE LATTER ARE CONTROLLED BY A FIELD AT RIGHT ANGLES TO THE DIRECTION OF PROPAGATION. THE POWER REQUIRED TO CONTROL THE MODULATOR CAN BE LOWERED BY INCREASING THE LENGTH OF THE CRYSTAL AND DECREASING ITS CROSS SECTION. DETAILS ON THE THERMAL EXPANSION OF VARIOUS PARTS AND MATERIALS ARE GIVEN AND THE EFFECTS OF EXPANSION ON MODULATOR OPERATION ARE DESCRIBED. THE MODULATOR WAS TESTED BETWEEN 0 AND 100 MC WITH A CONTROL VOLTAGE OF 15 KV. THE MODEL WAS TESTED IN AN EXPERIMENTAL TRANSMISSION OF A TELEVISION PICTURE WITH THE AID OF A LASER BEAM. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-672 955 20/5 20/6 17/2
RAND CORP SANTA MONICA CALIF

ELECTROMAGNETIC FIELD AND INTENSITY FLUCTUATIONS IN A WEAKLY INHOMOGENEOUS MEDIUM. (U)

JUL 68 40P YURA,H. T. ;
REPT. NO. RM-5697-PR
CONTRACT: F44620-67-C-0045

UNCLASSIFIED REPORT

DESCRIPTORS: (*ELECTROMAGNETIC FIELDS, PROPAGATION), (*COHERENT RADIATION, PROPAGATION), (*LIGHT COMMUNICATION SYSTEMS, SCATTERING), REFRACTIVE INDEX, LASERS, TURBULENCE, GREEN'S FUNCTION, PERTURBATION THEORY, RADAR (U)
IDENTIFIERS: RYTOV APPROXIMATION, MAXWELLS EQUATIONS, WAVE EQUATIONS (U)

A SELF-CONSISTENT GREEN'S FUNCTION TECHNIQUE IS USED TO OBTAIN THE ELECTROMAGNETIC FIELD AND ITS CORRESPONDING INTENSITY TO SECOND ORDER IN THE INDEX OF REFRACTION FLUCTUATIONS. IT IS FOUND THAT FOR PROPAGATION DISTANCES LESS THAN A CRITICAL LENGTH, THE PERTURBATION METHOD GIVES VALID RESULTS. THE FIELD IS PRIMARILY COHERENT SINCE THE FLUCTUATIONS IN THE FIELD ARE SMALL. THE SOLUTION OBTAINED FOR THE FIELD IS ALSO SHOWN TO CONSERVE ENERGY. WHEN THE SOLUTION OBTAINED HERE IS COMPARED WITH THE RESULTS OF THE RYTOV APPROXIMATION, IT IS CONCLUDED THAT THE RYTOV APPROXIMATION IS NOT VALID FOR PROPAGATION DISTANCES EXCEEDING THE CRITICAL LENGTH. FOR THESE DISTANCES, THE PERTURBATION METHOD BREAKS DOWN; THE FIELD IS ESSENTIALLY INCOHERENT SINCE THE COHERENT COMPONENT OF THE FIELD IS EXPONENTIALLY SMALL. FOR THESE RANGE VALUES, A STATISTICAL ARGUMENT IS GIVEN TO OBTAIN INTENSITY STATISTICS AND AN APPROXIMATE EXPRESSION VALID FOR ALL RANGE VALUES IS DERIVED FOR THE INTENSITY STATISTICS. THIS EXPRESSION IS FOUND TO BE IN GOOD AGREEMENT WITH EXPERIMENT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-673 759 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

RECENT FOREIGN DEVELOPMENTS IN LASER TECHNOLOGY. (U)

AUG 67 26P HUANG WU-HAN,;
REPT. NO. FTD-HT-67-216

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF K'O HSUEH T'UNG PAO (CHINESE PEOPLE'S REPUBLIC) N2 P166-174 1965.

DESCRIPTORS: (*LASERS, REVIEWS), MATERIALS, INSTRUMENTATION, RANGE FINDING, OPDAR, LIGHT COMMUNICATION SYSTEMS, INFRARED DETECTORS, CHINA (U)
IDENTIFIERS: TRANSLATIONS (U)

A REVIEW IS GIVEN OF NON-CHINESE LASER TECHNOLOGY. TOPICS INCLUDE: THE SEARCH FOR LASING MATERIALS; IMPROVEMENT OF LASER SYSTEMS AND APPARATUS; HIGH-INTENSITY OPTICS; APPLICATION OF LASER TECHNIQUES (OPTICAL LOCATING, OPTICAL RADAR, INFRARED RECEIVING). (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-673 876 17/2 20/5 22/2
AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS

DESIGN CONSIDERATIONS OF MULTIPLE LASER COMMUNICATION LINKS BETWEEN SYNCHRONOUS SATELLITE AND SEVERAL EARTH STATIONS, (U)

SEP 67 30P CHANG,N. C. ;BROCK,F. G.
;
REPT. NO. TR-0158(9230-02)-1
CONTRACT: F04695-67-C-0158
MONITOR: SAMSO TR-68-7

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, LIGHT COMMUNICATION SYSTEMS), (*SYNCHRONOUS SATELLITES, *LIGHT COMMUNICATION SYSTEMS), COMMUNICATION SATELLITES(ACTIVE), TELESCOPES, STABILITY, ATMOSPHERIC MOTION, SIGNAL-TO-NOISE RATIO, GAIN, SPACE-TO-SURFACE, BANDWIDTH, SECRET COMMUNICATION SYSTEMS (U)

SECURE AND PRIVATE MEGABIT-PER-SECOND COMMUNICATION LINKS BETWEEN A SATELLITE IN SYNCHRONOUS ORBIT AND SEVERAL GROUND STATIONS ARE DESIRED IN CERTAIN APPLICATIONS. THE HIGHLY DIRECTIONAL PROPERTY OF LASER BEAMS MAKES LASER WAVES AN APT CANDIDATE FOR THE CARRIER OF THE SYSTEM. THE LARGE POTENTIAL BANDWIDTH OF THE LASER SYSTEM CAN BE OF VALUE ALSO IN PROVIDING REDUNDANCY FOR RELIABILITY AND CODING FOR SECURITY. THE VERY DIRECTIONAL PROPERTY OF THE LASER BEAM, HOWEVER, PRESENTS PROBLEMS OF POINTING AND ACQUISITION. THESE PROBLEMS ARE PARTICULARLY SEVERE FOR THE CASE OF SIMULTANEOUS TRANSMISSION BETWEEN THE SATELLITE AND MULTIPLE GROUND TERMINALS. AN ADDITIONAL PROBLEM OF EFFICIENT OPTICAL ANTENNA GAIN ARISES FOR THIS CASE. RECENT ADVANCES IN HIGH-POWER, HIGHER-EFFICIENCY LASERS ENCOURAGE CONSIDERATION OF A LASER TRANSMITTER CONFIGURATION NOT PREVIOUSLY INVESTIGATED FOR MULTIPLE LINK COMMUNICATION OVER SYNCHRONOUS SATELLITE DISTANCES. IN THIS CONFIGURATION, A SATELLITE-BORNE LASER IS OPERATED IN A RELATIVELY HIGH-ORDER MODE. APPROPRIATE OPTICS ARE USED TO PROVIDE MULTIPLE LINKS, ONE LOBE OF THE BEAM FOR EACH LINK. ALSO MODE SWITCHING CAN PROVIDE ALTERNATIVE LINKS. THE GROUND TERMINALS ARE EACH EQUIPPED WITH SEPARATE LASERS. ASIDE FROM POOR ATMOSPHERIC SEEING, SATELLITE ATTITUDE STABILITY APPEARS TO BE THE KEY PERFORMANCE-LIMITING ELEMENT OF THE SYSTEM. (U)

UNCLASSIFIED /ZLW13

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-674 085 17/2 20/5 9/4
PENNSYLVANIA STATE UNIV UNIVERSITY PARK

SOME RESULTS ON ERROR RATES FOR A LASER BINARY COMMUNICATION SYSTEM, (U)

JAN 68 4P LACHS, GERARD ; JANKOWICH, EDWARD ;

CONTRACT: DA-31-124-ARO(D)-383
PROJ: DA-20014501B31E
MONITOR: AROD 5659:7

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PROCEEDINGS OF THE IEEE, V56 N4 P744-745 APR 68.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 11 DEC 67.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, *LASERS), ERRORS, PROBABILITY, SIGNAL-TO-NOISE RATIO, POWER (U)

THE PROBABILITY OF ERROR IS OBTAINED FOR A SIMPLE BUT FUNDAMENTAL FORM OF A LASER BINARY COMMUNICATION SYSTEM. THE RESULTS SHOW THAT THE PROBABILITY OF ERROR IS STRONGLY DEPENDENT UPON ARSOLUTE SIGNAL LEVEL AS WELL AS SIGNAL-TO-NOISE RATIO. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW1)

AD-674 170 17/2 20/14
ADVISORY GROUP FOR AERONAUTICAL RESEARCH AND DEVELOPMENT PARIS (FRANCE)

PROPAGATION FACTORS IN SPACE COMMUNICATIONS. (U)

DESCRIPTIVE NOTE: CONFERENCE PROCEEDINGS,
67 553P BLACKBAND,W. T. ;
REPT. NO. AGARD-CP-3

UNCLASSIFIED REPORT
AVAILABILITY: ADVISORY GROUP FOR AERONAUTICAL RESEARCH AND DEVELOPMENT, 7 RUE ANCELLE, 92 NEUILLY-SUR-SEINE, PARIS (FRANCE).

DESCRIPTORS: (*SPACE COMMUNICATION SYSTEMS, *PROPAGATION), SYMPOSIA, IONOSPHERIC PROPAGATION, PLASMA SHEATH, REENTRY VEHICLES, RADIO WAVES, TROPOSPHERE, IONOSPHERE, ATMOSPHERIC REFRACTION, ATTENUATION, LASERS, COMMUNICATION SATELLITES(ACTIVE) (U)
IDENTIFIERS: NATO (U)

THE IONOSPHERIC RESEARCH COMMITTEE OF THE AVIONICS PANEL OF AGARD/NATO HELD ITS TENTH ANNUAL SYMPOSIUM MEETING IN ROME 21-25 SEPTEMBER 1965. THE SUBJECT CHOSEN FOR DISCUSSION WAS 'PROPAGATION FACTORS IN SPACE COMMUNICATIONS'. THIS VOLUME PRESENTS THE FULL TEXT OF THOSE PAPERS WHICH HAVE NOT BEEN PRINTED ELSEWHERE AND ALSO AN ACCOUNT OF THE INFORMAL DISCUSSIONS WHICH FOLLOWED THE PRESENTATION OF THE PAPERS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-674 274 17/2 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

APPLICATIONS OF LASERS, (U)

NOV 67 11P HSIANG CH'UN,;
REPT. NO. FTD-HT-23-1024-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF K'O HSUEH HUA PAO (CHINESE PEOPLE'S REPUBLIC) N1 P13-15 1963.

DESCRIPTORS: (*LASERS, LIGHT COMMUNICATION SYSTEMS), (*COMMUNICATION SYSTEMS, CHINA), OPDAR, SPACE COMMUNICATION SYSTEMS, MAPPING, UNDERWATER COMMUNICATION SYSTEMS, LIGHT TRANSMISSION, UNDERWATER TRACKING, ELECTRON ACCELERATORS, DETECTION (U)
IDENTIFIERS: TRANSLATIONS (U)

LASERS CAN PRODUCE A LIGHT BEAM HAVING EXCELLENT DIRECTIVITY AND AN INTENSITY SEVERAL MILLION TIMES THE INTENSITY OF THE SUN. EXPERIMENTS PROVED THAT LASER BEAMS HAVE A BEAM SPREAD LESS THAN 30 CM FOR EVERY 1.5-KM PROPAGATION. RESEARCH IS UNDERWAY TO USE LASERS IN SPACE, SURFACE, AND UNDERWATER COMMUNICATIONS. LASERS WILL BE USED IN MILITARY DETECTION, MAPPING, COMPUTING TECHNOLOGY, AND SPACE NAVIGATION AND ALSO AS WEAPONS. WHEN LASERS ARE USED IN COMMUNICATIONS, THE AUDIO SIGNALS TO BE TRANSMITTED ARE USED TO MODULATE THE LIGHT BEAMS. THE MODULATED BEAMS ARE THEN TRANSMITTED BY AN OPTICAL TRANSMITTER. THE OPTICAL RECEIVER AT THE RECEIVING END WILL RECEIVE AND DEMODULATE THE INCOMING LIGHT SIGNALS. AN OPTICAL SYSTEM FOR SPACE COMMUNICATIONS USING SOLAR ENERGY FOR LASER PUMPING IS IN PROCESS OF DEVELOPMENT. OPTICAL RADARS REQUIRE A LOWER INPUT POWER THAN MICROWAVE RADARS. RESEARCH SHOWS THAT AN OPTICAL RADAR HAVING AN AVERAGE OUTPUT POWER OF 66 W IS CAPABLE OF DETECTING 2 SPACESHIPS 16,000 KM APART WITH AN ACCURACY APPROACHING 1 X 0.0001. A GROUND OPTICAL RADAR HAVING A 10-KM DETECTING RANGE WEIGHS ONLY 10 KG. LASERS EMITTING BLUE LIGHT BEAMS ARE USED FOR UNDERWATER TRACKING AND INTERSUBMARINE COMMUNICATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-674 349 17/2
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

CERTAIN DEMANDS ON THE OPTICAL FREQUENCY RECEIVERS IN COMMUNICATION SYSTEMS USING COHERENT LIGHT, (U)

NOV 67 16P HENG,CH'EN ;
REPT. NO. FTD-HT-23-606-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF WU HSIEN TIEN CHI SHU (CHINESE PEOPLE'S REPUBLIC) N11 P12-17 1965.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, DEMODULATION), LASERS, COHERENT RADIATION, SEMICONDUCTOR DEVICES, SIGNAL-TO-NOISE RATIO, PHOTOTUBES, PHOTOMULTIPLIERS, RESPONSE, EFFICIENCY, BANDWIDTH, INFRARED DETECTORS, CHINA (U)
IDENTIFIERS: TRANSLATIONS, HETERODYNING (U)

THE DEVELOPMENT OF THE LASER AS A COHERENT, EXCELLENT MONOCHROMATIC AND HIGHLY DIRECTIONAL OPTICAL SIGNAL SOURCE HAS LED TO ITS POSSIBLE APPLICATION IN OPTICAL COMMUNICATION. THE OBJECT OF THIS PAPER IS TO SET FORTH SOME SPECIAL REQUIREMENTS OF LIGHT DEMODULATORS FOR COHERENT LIGHT OPTICAL COMMUNICATION. LIGHT DEMODULATORS OPERATE IN A MANNER SIMILAR TO RADIO RECEIVERS, EXCEPT THAT THEY REQUIRE THE CONVERSION OF LIGHT INPUT TO PHOTOCURRENT AND THEIR NOISE HAS STRONG QUANTUM CHARACTERISTICS. GENERAL REQUIREMENTS FOR LIGHT DEMODULATORS ARE HIGH SENSITIVITY AND A HIGH SIGNAL TO NOISE RATIO. IN AN OPTICAL COMMUNICATION SYSTEM, THE PREFERRED MODULATION FREQUENCIES AND BAND WIDTHS ARE IN THE INFRA-RED RANGE AND HIGHER. SOME SEMICONDUCTORS ARE PROMISING FOR USE IN DEMODULATORS OPERATING IN THE INFRA-RED RANGE, BUT THEY DO NOT COMPLETELY FULFILL THE OTHER REQUIREMENTS. AMONG LIGHT DETECTION METHODS THAT CAN BE USED, OPTICAL HETERODYNING APPEARS TO BE OF PARTICULAR IMPORTANCE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

,0-675 075 20/6
CALIFORNIA UNIV BERKELEY

PHASE MODULATION OF Q-SWITCHED LASER BEAMS IN SMALL-SCALE FILAMENTS, (U)

FEB 68 7P CHEUNG,A. C. ;RANK,D. M. ;CHIAO,R. Y. ;TOWNES,C. H. ;
CONTRACT: DA-ARO(D)-31-124-G976, ARPA ORDER-675
MONITOR: AROD 7778:1

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS, V20 N15 P786-789, 8 APR 68.

DESCRIPTORS: (*COHERENT RADIATION, *PHASE MODULATION), CARBON COMPOUNDS, SULFIDES, LIGHT PULSES, BAND SPECTRUM, REFRACTIVE INDEX, LASERS, SIDEBANDS (U)
IDENTIFIERS: Q-SWITCHING, CARBON DISULFIDE (U)

THE SPECTRA OF SMALL-SCALE TRAPPED FILAMENTS OF LASER LIGHT IN CARBON DISULFIDE AND OTHER LIQUIDS CONTAIN DISCRETE BANDS OF FREQUENCIES EXTENDING TO EITHER SIDE OF THE LASER FREQUENCY. THE REGULARITY OF THESE PATTERNS, AND YET THE LACK OF A FIXED FREQUENCY BETWEEN BANDS AS EXPECTED FOR VARIOUS MODULATION PROCESSES, HAVE BEEN PUZZLING. IT IS FOUND THAT THE PATTERNS OBSERVED CORRESPOND TO THE INTENSITY ENVELOPE OF AN UNDERLYING STRUCTURE OF EQUALLY SPACED SIDEBANDS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-676 721 7/4 17/2
TECHNION - ISRAEL INST OF TECH HAIFA DEPT OF PHYSICS

DETERMINATION OF THE CO2 LINE PARAMETERS USING A CO2-N2-HE LASER, (U)

NOV 67 3P OPPENHEIM,URI P. ;DEVIR, ADAM D. ;

CONTRACT: AF-EOAR-26-67
MONITOR: AFOSR 68-2119

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF THE OPTICAL SOCIETY OF AMERICA, V58 N4 P585-586 APR 68.

DESCRIPTORS: (*CARBON DIOXIDE, ABSORPTION SPECTRUM), (*MOLECULAR ENERGY LEVELS, CARBON DIOXIDE), (*LIGHT COMMUNICATION SYSTEMS, ATTENUATION), BAND SPECTRUM, IRASERS, INFRARED RADIATION, LINE SPECTRUM, INFRARED SPECTROSCOPY, ATMOSPHERE, NITROGEN, HELIUM, ISRAEL (U)
IDENTIFIERS: ATMOSPHERIC ABSORPTION (U)

THE INTEGRATED INTENSITY AND WIDTH OF SINGLE ROTATIONAL LINES IN MOLECULAR BAND SPECTRA ARE IMPORTANT FACTORS IN THE DETERMINATION OF SPECTRAL EMISSIVITIES. THE RESULTS GIVEN IN THIS REPORT ALLOW PREDICTION OF LONG-PATH ATMOSPHERIC ABSORPTION OF CO2 LASER ENERGY. FOR EXAMPLE, A 10-M PATH OF PURE CO2 IS EQUIVALENT TO 30 KM OF AIR, IF A CONCENTRATION OF 0.033% OF CO2 IS ASSUMED. THUS FIG. 1 SHOWS THE ATTENUATION OF LASER RADIANT ENERGY IN A 30-KM PATH IN AIR, IF THE SAME PRESSURE BROADENING IN AIR IS ASSUMED AS IN PURE CO2. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-676 814 17/2 20/5
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

ATMOSPHERIC EFFECTS ON DIGITALLY MODULATED LASER TRANSMISSION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 68 21P WHATLEY,MERLE M. ;SMITH,
DONALD A. ;
REPT. NO. ECOM-3005
PROJ: DA-1-H-620501-A-448
TASK: 1-H-620501-A-44806

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, *LASERS), PULSE CODE MODULATION, ATMOSPHERE, METEOROLOGICAL PARAMETERS, TACTICAL WARFARE, DIGITAL SYSTEMS, ERRORS, AMPLITUDE MODULATION, SCINTILLATION (U)
IDENTIFIERS: POLARIZATION MODULATION (U)

THIS INVESTIGATION HAS PROVIDED DATA WHICH ALLOW THE EVALUATION OF THE LASER AS A TRANSMISSION DEVICE FOR DIGITAL INFORMATION. IN PARTICULAR, THE EFFECT OF THE ATMOSPHERE ON LASER PROPAGATION, MODULATION, AND COMMUNICATION CAPABILITIES PERTINENT TO TACTICAL APPLICATIONS HAS BEEN STUDIED. THESE STUDIES WERE MADE UNDER VARYING CONDITIONS OF WEATHER, PATH LENGTH, OPTICAL POWER, MODULATION DEPTH AND MODULATION METHOD. THE CHARACTERISTICS OF INTEREST IN EACH CASE WAS THE BIT-ERROR RATE OBTAINED WITH BINARY SERIAL BIT STREAMS. FROM THIS INFORMATION, THE OPERATION OF A LASER PCM SYSTEM MAY BE FORECAST. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-677 221 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

MORE POWERFUL THAN THE HYPERBOLOID. (U)

DEC 67 9P ANDREEV,O. ;
REPT. NO. FTD-HT-23-1696-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF VOENNYE ZNANIYA (USSR) V41 N2 P38-39 1965, BY L. HEENAN.

DESCRIPTORS: (*LASERS, REVIEWS), COHERENT RADIATION, LIGHT COMMUNICATION SYSTEMS, EXTRATERRESTRIAL RADIO WAVES, MIRRORS, FOCUSING, HEAT, USSR (U)
IDENTIFIERS: DEATH RAYS, HYBERBOLOIDS, PLASMA DIAGNOSTICS, TRANSLATIONS (U)

MANY PRE-WORLD WAR II SOVIET PUBLICATIONS CARRIED ARTICLES ON THE SO-CALLED 'DEATH RAYS.' MORE OFTEN THAN NOT, THESE ARTICLES, BASED LARGELY ON NON-SOVIET DATA, WERE PURE SCIENCE FICTION. THE FEW SERIOUS ARTICLES REFERRED TO DEADLY WEAPONS USING HEAT RAYS. THE CONCEPT OF WEAPONRY CHANGED DRASTICALLY WITH THE ADVENT OF LASERS, WHICH EMIT STIMULATED RATHER THAN THERMAL RADIATION. MENTION IS MADE OF THE USE OF LASERS IN MULTICHANNEL COMMUNICATION SYSTEMS, RANGING OF PLANETARY SURFACES, METALLURGY, PLASMA DIAGNOSTICS, BIOLOGY, MEDICINE, ETC. THE ARTICLE ALSO REVIEWS SOVIET CONTRIBUTIONS TO THE DEVELOPMENT OF THE LASER. (U)

DD. REF RT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-677 374 9/1 17/2
MICHIGAN UNIV ANN ARBOR ELECTRON PHYSICS LAB

E-TYPE PHOTODEMODULATORS FOR COHERENT LIGHT SIGNALS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,
AUG 68 47P MASON,JOHN L. ;
REPT. NO. TR-111, 07094-1-F
CONTRACT: DA-ARO(D)-31-124-G63"
PROJ: DA-20014501-B-31-E, 07094
MONITOR: AROD 5427:4-E

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, PHOTOTUBES), (*PHOTOTUBES, DEMODULATORS), DESIGN, S BAND, COHERENT RADIATION, LASERS, TRAVELING-WAVE TUBES, RESISTANCE(ELECTRICAL), ELECTRON BEAMS, ELECTROSTATIC FIELDS, FOCUSING (U)
IDENTIFIERS: *PHOTODEMODULATORS (U)

THE THEORETICAL STUDIES ARE SUMMARIZED AND AN EXPERIMENTAL INVESTIGATION IS REPORTED FOR AN E-TYPE TRAVELING-WAVE PHOTOTUBE. THE PRINCIPAL FEATURE OF SUCH A DEVICE IS THE CENTRIFUGAL ELECTROSTATIC FOCUSING OF THE ELECTRON BEAM. THE THEORETICAL STUDY YIELDS A SMALL-SIGNAL POWER THEOREM, THE TYPES OF WAVES PROPAGATING ALONG A THIN E-TYPE BEAM, AND A SMALL-SIGNAL ANALYSIS OF THE TRAVELING-WAVE PHOTOTUBE. AN EXPRESSION FOR THE EQUIVALENT RESISTANCE OF THE DEVICE IS DERIVED, WITH NUMERICAL RESULTS GIVEN FOR THE CASE OF ZERO CIRCUIT LOSS, ZERO SPACE CHARGE, AND SYNCHRONOUS BEAM VELOCITY. FOR COMPARISON, EQUIVALENT RESISTANCE VALUES ARE GIVEN FOR O-TYPE PHOTOTUBES. THE EXPERIMENTAL INVESTIGATION INVOLVED A PHOTOTUBE DESIGNED TO OPERATE AT S-BAND. DESIGN CONSIDERATIONS AND MEASUREMENT TECHNIQUES ARE DISCUSSED. EXPERIMENTAL CURVES FOR THE EQUIVALENT RESISTANCE ARE PRESENTED AND COMPARED WITH THE THEORETICAL RESULTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-679 802 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

NEWS OF INSTITUTIONS OF HIGHER LEARNING. PHYSICS, VOLUME 10, NUMBER 8, 1967 (SELECTED ARTICLES). (U)

MAY 68 17P KABANOV,M. V. ;BUKATYI,V. I. ;

REPT. NO. FTD-HT-23-251-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENII. FIZIKA (USSR) V10 N8 P26-30, 142-144 1967, BY F. DION.

DESCRIPTORS: (*LASERS, *LIGHT TRANSMISSION), ATMOSPHERE, LIGHT COMMUNICATION SYSTEMS, SCATTERING, FOG, ATTENUATION, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

CONTENTS: ATTENUATION OF COLLIMATED LIGHT BEAMS IN DISPERSIVE MEDIA; ATTENUATION OF LASER BEAMS IN ARTIFICIAL WATER FOGS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-680 574 17/2 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

LIGHT RAYS THAT CARRY INFORMATION. (U)

MAY 68 14P EIDUS,YA. ;
REPT. NO. FTD-HT-23-1544-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF NAUKA I TEKHNIKA (USSR) N11 P5-9 1966, BY R. ZECCOLA.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, *LASERS), (*LIGHT, MODULATION), ELECTROOPTICS, BANDWIDTH, PUMPING(OPTICAL), MAGNETO-OPTIC EFFECT, BIREFRINGENCE, PIEZOELECTRIC CRYSTALS, USSR (U)
IDENTIFIERS: TRANSLATIONS, OPTICAL MODULATORS (U)

THE EVER-EXPANDING NEED FOR EXCHANGE OF INFORMATION HAS CROWDED THE RADIO FREQUENCY SPECTRUM. A QUALITATIVELY NEW SOLUTION TO THE PROBLEM OF CHANNEL CAPACITY IS OFFERED BY THE RECENTLY CREATED SOURCES OF MONOCHROMATIC COHERENT LIGHT. THESE SO-CALLED MASERS AND LASERS OPERATE AT EXTREMELY HIGH FREQUENCIES, AND, SINCE THE QUANTITY OF INFORMATION THEORETICALLY ABLE TO BE TRANSMITTED ON A COMMUNICATIONS CHANNEL IS DIRECTLY PROPORTIONAL TO THE FREQUENCY, THEIR THEORETICAL INFORMATION CAPACITY IS TREMENDOUS. THE CAPACITY OF A LASER COMMUNICATIONS CHANNEL IS AT LEAST 1000 TIMES GREATER THAN THE CAPACITY OF ALL RADIO CHANNELS USED UP TO NOW, INCLUDING MICROWAVE. THE PRIMARY PROBLEM HINDERING LASER COMMUNICATIONS NOW IS MODULATION OF THE LASER BEAM. THEORETICALLY, ANY OF THE FOUR STANDARD PARAMETERS OF A LASER BEAM CAN BE MODULATED TO PLACE INFORMATION OF THE BEAM: FREQUENCY, AMPLITUDE, PHASE AND POLARIZATION. ACTUALLY, TWO PRIMARY METHODS CAN BE USED TO MODULATE THE LIGHT BEAM EXITING FROM A LASER: INTERNAL AND EXTERNAL METHODS. IN THE FIRST CASE, THE LIGHT BEAM IS ACTED UPON AS IT IS BEING FORMED, I.E., WITHIN THE ACTUAL LASER. IN THE SECOND CASE, THE MODULATION IS PERFORMED AFTER THE BEAM HAS BEEN CREATED. INTERNAL METHODS INCLUDE REGENERATION MODULATION, MODULATION USING THE STARK EFFECT AND MODULATION USING THE SEEMAN EFFECT. SCIENTISTS AT PRESENT ARE GIVING PREFERENCE TO THE EXTERNAL MODULATION METHODS, WHICH INCLUDE MODULATION OF THE PUMPING, MECHANICAL MODULATION, MODULATION USING THE FARADAY EFFECT, MODULATION USING THE KERR EFFECT (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-682 079 20/6
SIGNALS RESEARCH AND DEVELOPMENT ESTABLISHMENT
CHRISTCHURCH (ENGLAND)

A LOW DRIVE-POWER LIGHT MODULATOR USING A READILY AVAILABLE MATERIAL ADP, (U)

MAY 68 16P DORE,M. ;
REPT. NO. SRDE-68009

UNCLASSIFIED REPORT

DESCRIPTORS: (*ELECTROOPTICS, MODULATION), (*MODULATORS, LIGHT), LIGHT COMMUNICATION SYSTEMS, LASERS, AMMONIUM COMPOUNDS, PHOSPHATES, BANDWIDTH, LIGHT TRANSMISSION, BIREFRINGENCE, GREAT BRITAIN (U)
IDENTIFIERS: AMMONIUM DIHYDROGEN PHOSPHATE (U)

A VIDEO-FREQUENCY TRANSVERSE ELECTROOPTIC LIGHT AMPLITUDE MODULATOR UTILIZING THE MATRIX ELEMENT R41 IN ADP IS DESCRIBED AND COMPARED FAVORABLY WITH OTHER MODULATOR CONFIGURATIONS USING ADP, KDP, AND KD*P. IT UTILIZES TWO CRYSTALS TO COMPENSATE FOR TEMPERATURE AND ANGULAR DEPENDENCES OF BIFRINGENCE, AND HAS MORE THAN ADEQUATE STABILITY FOR NORMAL LABORATORY USE. A USEFUL BUILT-IN OPTICAL BIAS CONTROL IS PROVIDED. FREQUENCY RESPONSE HAS BEEN MEASURED BETWEEN 50 HZ AND 5 MHZ AND FOUND TO BE FLAT. VIDEO SIGNALS HAVE BEEN TRANSMITTED OVER A LASER COMMUNICATION LINK USING ONLY 50-VOLT PEAK-TO-PEAK DRIVE. HALF-WAVE VOLTAGE IS 220 VOLTS AND CAPACITY IS 53 PF, GIVING A DRIVE-POWER REQUIREMENT OF 2.6 WATTS PER MHZ OF BANDWIDTH FOR 100 PERCENT MODULATION DEPTH, OR 290 MW FOR 50-PERCENT MODULATION DEPTH. OPTICAL TRANSMISSION WAS 70 PERCENT ACHIEVED BY USING AN INDEX MATCHING LIQUID. AN EXTINCTION RATIO OF 30:1 WAS OBTAINED USING A LASER LIGHT SOURCE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW1

AD-682 432 7/3 17/2 9/1
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

DESCRIPTIONS OF INVENTIONS. (U)

JUN 68 21P BERLIN,A. A. ;MURADYAN,A. G. ;NESMEYANOV,A. N. ;ANFILOV,E. A. ; VOLKOV,A. S. ;
REPT. NO. FTD-HT-23-59-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF A COLLECTION OF SOVIET PATENTS, BY L. MAROKUS.

DESCRIPTORS: (*PATENTS, USSR), CHELATE COMPOUNDS, FERROCENES, LIGHT COMMUNICATION SYSTEMS, DATA TRANSMISSION SYSTEMS, LASERS, ALKYLATION, DIPOLE ANTENNAS, ANTENNA ARRAYS, ELECTRIC FILTERS, MAGNETOSTRICTION, DELAY LINES (U)

CONTENTS: METHOD OF OBTAINING FERROCENE DERIVATIVES; DEVICE FOR TRANSMISSION AND RECEPTION OF INFORMATION BY LIGHT CARRIER; METHOD OF OBTAINING ALKYL DERIVATIVES OF FERPOCENE; COPHASIAL ANTENNA ARRAY WITH ELECTRIC SCANNING; PASSIVE OPTIMUM FILTER. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-682 768 17/2 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

COMMUNICATIONS APPLICATIONS OF LASERS. (U)

MAR 68 103P KOBZEV,V. V. ;MILINKIS,B. M. ;EMELYANOV,R. G. ;
REPT. NO. FTD-HT-23-1179-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF MONO. PRIMENENIE OPTICHESKIKH KVANTOVYKH GENERATOROV DLYA TSELEI SVYAZI, MOSCOW, 1965 P1-120.

DESCRIPTORS: (*LASERS, *LIGHT COMMUNICATION SYSTEMS), MODULATION, DEMODULATORS, PHOTOCATHODES, PHOTOMULTIPLIERS, PHOTODIODES, PHOTOELECTRIC MATERIALS, RADIO COMMUNICATION SYSTEMS, OPERATION, DESIGN, USSR (U)
IDENTIFIERS: TRANSLATIONS, PHOTODETECTORS, LASER MODULATORS (U)

CONTENTS: OPERATING PRINCIPLE AND ARRANGEMENT OF THE LASER; METHODS OF MODULATING LASER EMISSION; MAIN TYPES OF PHOTODETECTORS; RADIO COMMUNICATIONS SYSTEMS EMPLOYING LASERS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-684 149 20/6
LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY DIV

LIGHT PROPAGATION IN A TURBULENT ATMOSPHERE. (U)

DESCRIPTIVE NOTE: SURVEYS OF FOREIGN SCIENTIFIC AND TECHNICAL LITERATURE,
MAR 69 37P POLUSHKIN,ANDREY ;
REPT. NO. ATD-67-52

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT TRANSMISSION, *ATMOSPHERIC MOTION), SCIENTIFIC PERSONNEL, SYMPOSIA, SCINTILLATION, COHERENT RADIATION, LASERS, OPTICAL IMAGES, USSR (U)

THE REPORT PRESENTS A COMPREHENSIVE OUTLINE OF SOVIET RESEARCH ON THE PROPAGATION OF LIGHT IN A TURBULENT ATMOSPHERE. THE MAJORITY OF SOURCE MATERIALS SCANNED AND PROCESSED FOR THIS STUDY WERE PUBLISHED DURING THE LAST DECADE. AN ATTEMPT WAS MADE TO TRACE THE DEVELOPMENT OF THE MAJOR AVENUES OF RESEARCH ON THIS SUBJECT AS FOLLOWED BY THE PRINCIPAL SOVIET INVESTIGATORS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-688 411 17/2 20/6
RAND CORP SANTA MONICA CALIF

APERTURE AVERAGING OF OPTICAL SCINTILLATION, (U)

APR 69 23P YURA,H. T. ;LUTOMIRSKI,R. F. ;

REPT. NO. RM-5902-ARPA
CONTRACT: DAHC15-67-C-0141, ARPA ORDER-189-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, OPTICAL EQUIPMENT COMPONENTS), (*LIGHT TRANSMISSION, ATMOSPHERIC MOTION), TURBULENCE, SCINTILLATION, PROPAGATION, LASERS, APPROXIMATION(MATHEMATICS), ANALYSIS OF VARIANCE (U)
IDENTIFIERS: APERTURES, SIGNAL PROCESSING (U)

THE APERTURE-AVERAGING FACTOR OF A CIRCULAR APERTURE IS DERIVED. THIS FACTOR GIVES THE EFFECT OF A FINITE RECEIVING APERTURE ON SPHERICAL AND PLANE WAVES IN REDUCING THE VARIANCE OF A FLUCTUATING LIGHT SIGNAL. CURVES OF THE REDUCTION FACTOR AND NORMALIZED SIGNAL STANDARD DEVIATION AS A FUNCTION OF RANGE AND RECEIVER APERTURE DIAMETER ARE PRESENTED AND ARE COMPARED WITH THOSE WHICH WERE PREVIOUSLY CALCULATED. IT IS SHOWN THAT FRIED'S RESULTS AGREE WITH THE RESULTS OBTAINED HERE ONLY FOR PROPAGATION DISTANCE WHERE THE AVERAGE FIELD IS DOWN BY A FACTOR OF THE ORDER E TO THE -1 POWER. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-691 846 20/6 20/5
TRW SYSTEMS REDONDO BEACH CALIF QUANTUM PHYSICS LAB

HIGH INTENSITY LASER PROPAGATION IN THE ATMOSPHERE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 69 91P FRANTZ,L. M. ;HOLSTEIN,T. D. ;
REPT. NO. 05691-6014-RO-00
CONTRACT: N00014-66-C-0022, ARPA ORDER-306

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, *LIGHT TRANSMISSION), (*COHERENT RADIATION, IONOSPHERIC PROPAGATION), ATMOSPHERE, ABSORPTION, HEATING, FOCUSING, BAND SPECTRUM, CARBON DIOXIDE, INTENSITY, NONLINEAR SYSTEMS (U)

THE RESEARCH REPORTED HERE INVOLVES THE THERMAL SELF-DEFOCUSING EFFECT, WHICH OCCURS IN THE CASE OF HIGH ENERGY LASER BEAM PROPAGATION IN THE ATMOSPHERE. TWO SUBJECTS ARE INVESTIGATED, NAMELY, HEATING MECHANISMS, AND THE DYNAMICS OF THE PROPAGATING LASER BEAM. THE HEATING MECHANISM STUDY IS CONCERNED SPECIFICALLY WITH PHOTO-ABSORPTION IN THE FAR WINGS OF PRESSURE BROADENED CO2 VIBRATION-ROTATION BANDS, WHILE THE BEAM DYNAMICS ANALYSIS TREATS THE EFFECTS OF TARGET MOTION ON THE DEGREE OF SELF-DEFOCUSING OF THE LASER BEAM. A THEORY OF FAR-WING PRESSURE BROADENING IS DEVELOPED IN WHICH THE BASIC BROADENING MECHANISM IS ASSUMED TO ARISE FROM PERTURBATIONS OF THE ABSORBER'S ROTATIONAL MOTION VIA A SHORT RANGE REPULSIVE INTERACTION WITH A COLLIDING MOLECULE. THE THEORY PREDICTS A FAR-WING SPECTRAL BEHAVIOR DESCRIBED BY A PRODUCT OF A LORENTZ LINE SHAPE AND AN EXPONENTIALLY DECREASING FACTOR, IN GENERAL AGREEMENT WITH RECENT MEASUREMENTS. IN THE BEAM DYNAMICS WORK A CONVENIENT CLOSED FORM EXPRESSION HAS BEEN OBTAINED FOR THE MAXIMUM FLUX WHICH THE THERMAL SELF-DEFOCUSING EFFECT PERMITS ONE TO TRANSMIT THROUGH THE ATMOSPHERE. THIS ANALYSIS TAKES INTO ACCOUNT THE EFFECT OF TARGET MOTION. THE EXPRESSION FOR THE MAXIMUM FLUX DEPENDS UPON SUCH PARAMETERS AS THE INITIAL BEAM INTENSITY, THE INITIAL BEAM DIAMETER, THE TARGET DISTANCE, THE ROTATIONAL RATE OF THE BEAM, AND THE EFFECTIVE ABSORPTION COEFFICIENT FOR HEATING OF AIR BY LIGHT AT THE LASER FREQUENCY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-692 438 20/6
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

INTERFEROMETRIC PHASE AND AMPLITUDE FLUCTUATION MEASUREMENTS OVER A 7KM ATMOSPHERIC PATH. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,
MAY 69 35P GEHRELS,ERNST J
REPT. NO. TN-1969-28
CONTRACT: AF 19(628)-5167, ARPA ORDER-512
MONITOR: ESD TR-69-111

UNCLASSIFIED REPORT

DESCRIPTORS: (*ATMOSPHERIC MOTION, LIGHT TRANSMISSION), (*COHERENT RADIATION, PHASE SHIFT), INTERFEROMETERS, LASERS, FREQUENCY MODULATION, CORRELATION TECHNIQUES, DISTRIBUTION FUNCTIONS, INTENSITY (U)

A 6328 A LASER INTERFEROMETER OF THE MICHELSON TYPE HAS A ONE-WAY PATH LENGTH OF 7 KM. THE FRINGES ARE RESOLVED BY FREQUENCY-MODULATING THE LASER SUFFICIENTLY TO SWEEP OVER AT LEAST ONE FRINGE WIDTH. BY CORRELATION TECHNIQUES, THE RESULTING FRINGE INTENSITY PATTERN IS RESOLVED INTO THE TRUE FRINGE CROSSING DIRECTION AND RATE AND INTO LIGHT AMPLITUDE FLUCTUATIONS. AN UPPER LIMIT OF 300 PER SECOND IS ESTABLISHED FOR THE FORMER, THE AMPLITUDE FLUCTUATIONS BEING AT A SLOWER RATE. WITH A MEASURED INTENSITY RANGE OF UP TO 5000:1, IT IS CLEAR FROM THE DATA THAT NONE OF THE CURRENTLY POSTULATED RAYLEIGH, LOG NORMAL, OR RICE DISTRIBUTIONS MATCH THE AMPLITUDE STATISTICS OVER THIS FULL RANGE. A LIMITING VALUE OF STANDARD DEVIATION FOR THE LOG OF THE AMPLITUDE IS 0.85. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-693 230 17/2 9/5
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D C

ANTENNAS FOR THE OPTICAL WAVE BAND. (U)

AUG 69 18P TYZHNOV,YU. V. ;FRIDMAN,G. KH. ;
REPT. NO. FSTC-HT-23-309-69
PROJ: FSTC-02TR1002301

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF MONO. SOVREMENNYE PROBLEMY ANTENNO-VOLNOVODNOI TEKHNIKI (PRESENT DAY PROBLEMS OF ANTENNA WAVEGUIDE TECHNIQUES), N.P., 1967 P189-201.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, LASERS), (*LASERS, *ANTENNAS), FIELD THEORY, ELECTROMAGNETIC FIELDS, ANTENNA RADIATION PATTERNS, LIGHT HOMING, LIGHT TRANSMISSION, USSR (U)
IDENTIFIERS: TRANSLATIONS, OPTICAL ANTENNAS (U)

THIS ARTICLE DESCRIBES ANTENNAS FOR OPTICAL BAND USE WITH LASERS FOR COMMUNICATION AND LOCATION PURPOSES. THE USE OF VERY SHORT WAVES MAKES IT POSSIBLE TO EMPLOY EXTREMELY NARROW BEAM ANTENNAS. OPTICAL SYSTEMS FOR USE WITH TRANSMITTING AND RECEIVING ANTENNAS ARE DESCRIBED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-693 623 17/2 20/5
HAWAII UNIV HONOLULU DEPT OF ELECTRICAL ENGINEERING

LASER COMMUNICATIONS FOR THE ALOHA SYSTEM. (U)

DESCRIPTIVE NOTE: PRELIMINARY REPT.,
MAY 69 21P KANEHIRA,EARL ;
REPT. NO. THEMIS-B69-1
CONTRACT: F44620-69-C-0030
PROJ: AF-9749
TASK: 974901
MONITOR: AFOSR 69-2028TR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON THE ALOHA SYSTEM.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, *LASERS), DATA TRANSMISSION SYSTEMS, DIODES(SEMICONDUCTOR), INTERFACES, DIGITAL SYSTEMS, PULSE CODE MODULATION, GALLIUM ARSENIDES (U)
IDENTIFIERS: *ALOHA COMMUNICATION SYSTEM (U)

IN THE LASER COMMUNICATION SYSTEM DESIGNED FOR DATA TRANSMISSION AND RECEPTION, THE INFORMATION CARRYING BINARY PULSE TRAIN IS USED TO ACTIVATE (FORWARD BIAS) AND DEACTIVATE (REVERSE BIAS) A LIGHT EMITTING DIODE. WHEN ACTIVATED, THE LIGHT EMITTING DIODE EMITS NEAR-INFRARED LIGHT, AND WHEN DEACTIVATED, NOTHING IS EMITTED. THE RECEIVER THEN DETECTS THE PRESENCE OR ABSENCE OF THE NEAR INFRARED RADIATION, USING A LIGHT SENSING DIODE. IN THE PRESENCE OF LIGHT, THE LIGHT SENSING DIODE PRODUCES A LARGE PHOTOCURRENT, AND IN THE ABSENCE OF LIGHT, IT PRODUCES A SMALL CURRENT. ANY DATA TERMINAL THAT CAN PRODUCE AND ACCEPT BINARY INFORMATION CAN BE USED DIRECTLY IN A LASER COMMUNICATIONS SYSTEM WITHOUT ANY INTERFACE PROBLEMS BETWEEN THE TERMINAL AND THE TRANSMITTER OR RECEIVER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-693 905 17/5
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

HOMODYNE DETECTION OF INFRARED RADIATION FROM A MOVING DIFFUSE TARGET. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,
MAR 69 9P TEICH,MALVIN CARL ;
REPT. NO. JA-3427
CONTRACT: AF 19(628)-5167, NSF-GK-3620
MONITOR: ESD TR-69-232

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PROCEEDINGS OF THE IEEE, V57 N5 P786-792 MAY 69.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 20 JAN 69.

DESCRIPTORS: (*INFRARED RADIATION, DETECTION), GAS LASERS, CARBON DIOXIDE, COHERENT RADIATION, SCATTERING, POWER SPECTRA, PROBABILITY DENSITY FUNCTIONS, TARGETS, OPDAR, INFRARED DETECTORS (U)
IDENTIFIERS: CARBON DIOXIDE LASERS (U)

EXPERIMENTS HAVE BEEN PERFORMED IN WHICH THE RADIATION FROM A CO2 LASER WAS COHERENTLY DETECTED AFTER BEING SCATTERED FROM A MOVING DIFFUSE REFLECTOR. THIS IS GENERALLY THE CONFIGURATION OF AN INFRARED LASER RADAR. THE POWER-SPECTRAL-DENSITY OF THE HETERODYNE SIGNAL WAS MEASURED AND ITS WIDTH WAS SHOWN TO AGREE WITH THE CALCULATED VALUE BASED ON A THEORETICAL MODEL FOR THE PROCESS. EXPRESSIONS ARE OBTAINED FOR THE RATIO OF HETERODYNE SIGNAL BANDWIDTH TO HETERODYNE FREQUENCY FOR THE CASES OF FOCUSED RADIATION, UNFOCUSED RADIATION, AND FOR A TYPICAL RADAR CONFIGURATION. IN MOST CASES, THE HETERODYNE SIGNAL IS FOUND TO POSSESS A NARROW-BAND CHARACTER. THE PROBABILITY DENSITY OF THE SIGNAL ENVELOPE WAS ALSO MEASURED FOR A KNOWN SCATTERER (PROVIDING GAUSSIAN SCATTERED RADIATION) AND WAS FOUND TO BE RAYLEIGH DISTRIBUTED, AS EXPECTED. THE POWER-SPECTRAL-DENSITY AND ENVELOPE PROBABILITY DISTRIBUTION PROVIDE INFORMATION ABOUT A SCATTERING MEDIUM OR TARGET WHICH CANNOT BE OBTAINED FROM AVERAGE-VALUE MEASUREMENTS OF THE HETERODYNE SIGNAL-TO-NOISE RATIO. THIS INFORMATION IS USEFUL FOR COMMUNICATIONS APPLICATIONS, INFRARED RADAR, AND HETERODYNE SPECTROSCOPY EXPERIMENTS. FINALLY, A SIMPLE AND DIRECT METHOD OF OBTAINING INFORMATION ABOUT THE STATISTICS OF AN INCIDENT RADIATION FIELD (WHICH DOES NOT INVOLVE PHOTOCOUNTING) IS DISCUSSED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-693 939 17/2 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

ROGER EARTH, OVER...., (U)

MAR 69 7P POKROVSKII,G. I
REPT. NO. FTD-HT-23-1237-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF TEKHNIKA-MOLODEZHI (USSR) V35 N11 P37-38 1967, BY L. THOMPSON.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, FEASIBILITY STUDIES), LASERS, RUBY, GAS IONIZATION, CONVEYORS, PIPES, ENERGY, MATERIALS, USSR (U)
IDENTIFIERS: INTERPLANETARY PIPELINES, TRANSLATIONS (U)

THE AUTHOR ASSERTS THAT EVENTUALLY SCIENTISTS WITH THE AID OF A LASER WILL BE SUCCESSFUL IN THEIR ATTEMPTS TO TRANSMIT ENERGY IN THE FORM OF A LIGHT BEAM FROM THE EARTH TO THE MOON. HE STATES THAT BESIDES ENERGY AND INFORMATION, THIS SAME CONVEYER COULD BE USED TO TRANSMIT OTHER MATTER, SUCH AS FUEL, AIR, AND METALS, THEREBY PARTIALLY SOLVING ONE OF THE MAJOR PROBLEMS OF DELIVERING ESSENTIAL GOODS TO THE MOON AND POSSIBLY TO OTHER PLANETS AT A MINIMUM COST. HE SUGGESTS A HOLLOW LASER BEAM, WHICH COULD BE ACHIEVED WITH THE USE OF LIGHT CONDUCTORS OR A HOLLOW RUBY ROD. SUCH PIPELINES COULD REACH THROUGH SPACE FROM ONE PLANET TO ANOTHER CARRYING INFORMATION, ENERGY, AND MATTER. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-695 279 9/4 17/2
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ELECTRICAL ENGINEERING

INFORMATION RATES FOR PHOTOCOUNT DETECTION SYSTEMS, (U)

JAN 69 7P FILLMORE, GARY L. ; LACHS, GERARD ;

CONTRACT: DA-31-124-ARO(D)-383
PROJ: DA-20-061102-B-13-E
MONITOR: AROD 5659:8-E

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN IEEE TRANSACTIONS ON INFORMATION THEORY VIT-15 N4 P465-468 JUL 69.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 11 OCT 68.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, *INFORMATION THEORY), (*COHERENT RADIATION, DETECTION), (*PHOTOELECTRONS, COUNTING METHODS), MATHEMATICAL MODELS, LASERS (U)
IDENTIFIERS: OPTICAL COMMUNICATION, TELECOMMUNICATION, RANDOM NOISE (U)

A MODEL THAT ALLOWS ONE TO CALCULATE INFORMATION RATES FOR OPTICAL COMMUNICATION SYSTEMS THAT USE PHOTOCOUNT DETECTION IS PRESENTED. THIS MODEL HAS ITS BASIS IN THE COHERENT STATES OF THE FIELD. IT CONSISTS OF A SOURCE THAT PLACES THE FIELD IN A COHERENT STATE, A CHANNEL THAT CAN INTRODUCE ADDITIVE GAUSSIAN NOISE, AND A PHOTODECTOR THAT PRODUCES THE NUMBER OF PHOTOCOUNTS IN THE DETECTION INTERVAL AS OUTPUT SYMBOLS. THE CAPABILITY OF INTRODUCING ADDITIVE GAUSSIAN NOISE CAN ALSO BE USED TO REPRESENT A PHYSICAL SOURCE. THE MODEL IS APPLIED TO SEVERAL EXAMPLES TO ILLUSTRATE ITS USE. THE RATE OF FLOW OF INFORMATION THROUGH THE CHANNEL IS CALCULATED FOR A BINARY CHANNEL WITH AND WITHOUT ADDITIVE GAUSSIAN NOISE. THE INFORMATION RATE FOR A NOISELESS CHANNEL IS ALSO OBTAINED FOR THE CASE IN WHICH THE SIGNALS SENT BY A SINGLE-MODE COHERENT SOURCE ARE SELECTED FROM A GAUSSIAN DISTRIBUTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-695 945 20/5 17/2
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

CERTAIN CHARACTERISTICS OF A GA AS OPTICAL QUANTUM AMPLIFIER, (U)

JUL 69 12P MOMA,YU. A. ;ABRAMOV,V. S. ;KOBZEV,V. V. ;
REPT. NO. FTD-MT-24-127-69

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO. POLUPROVODNIKOVYE PRIBORY V TEKHNIKE ELEKTROSVYAZI. SBORNIK STATEI (SEMICONDUCTOR INSTRUMENTS IN THE TECHNOLOGY OF TELECOMMUNICATION. COLLECTION OF ARTICLES), N.P., 1968 P141-145.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, FEASIBILITY STUDIES), (*SEMICONDUCTOR DEVICES, *LASERS), GALLIUM ARSENIDES, LIGHT PULSES, CRYOGENICS, USSR (U)
IDENTIFIERS: GALLIUM ARSENIDE LASERS, TRANSLATIONS (U)

THE ARTICLE GIVES RESULTS OF THE MEASUREMENT OF AMPLIFICATION FACTORS OF A SEMICONDUCTOR OPTICAL QUANTUM AMPLIFIER OKU BASED ON GALLIUM ARSENIDE, IN PULSE CONDITIONS AT THE TEMPERATURE OF LIQUID NITROGEN. CONCLUSIONS ARE DRAWN AS TO THE PROSPECTS OF THE APPLICATION OF OKU IN OPTICAL COMMUNICATION LINES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-699 665 20/5
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

SOME CHARACTERISTICS OF A HELIUM-NEON LASER WITH A KDP CRYSTAL INSIDE THE RESONATOR, (U)

OCT 69 12P KRIVOSHCHEKOV,G. V. ; TELEGIN,G. G. ;FOLIN,K. G. ;
REPT. NO. FTD-HT-23-404-69
PROJ: FTD-7230178

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF AKADEMIYA NAUK SSSR. SIBIRSKOE OTDELENIE. IZVESTIYA, SERIYA KHIMICHESKIKH NAUK, N1 P127-131 1968, BY H. PECK.

DESCRIPTORS: (*GAS LASERS, *MODULATION), MODULATORS, ELECTROOPTICS, POTASSIUM COMPOUNDS, PHOSPHATES, ELECTRIC FIELDS, USSR (U)
IDENTIFIERS: HELIUM NEON LASERS, POTASSIUM DIHYDROGEN PHOSPHATE, POTASSIUM PHOSPHATES, TRANSLATIONS, *LASER MODULATORS (U)

THE DEPENDENCE OF RADIATION INTENSITY OF A HE-NE LASER ON ORIENTATION OF AN ELECTROOPTICAL CRYSTAL AND ON CONTROLLING ELECTRIC FIELD STRENGTH WAS STUDIED TO OPTIMIZE OPERATING CONDITIONS OF THE LASER WITH INTERNAL MODULATION. THE ELECTROOPTICAL CRYSTAL WAS PLACED INSIDE A 2-MIRROR RESONATOR SO THAT THE NORMAL OF THE CRYSTAL SURFACE MADE THE BREWSTER ANGLE WITH THE DIRECTION OF INCIDENT BEAM AND SO THAT THE DIRECTION OF THE BEAM INSIDE THE CRYSTAL AGREED WITH THE DIRECTION OF THE OPTICAL AXIS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-700 049 20/6 20/5
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS

TRANSVERSE MODE ELECTRO-OPTIC MATERIALS. (U)

DESCRIPTIVE NOTE: PHYSICAL SCIENCES RESEARCH PAPERS, JAN 70 21P ARMINGTON,A. F. ;O'CONNOR, J. J. ;
REPT. NO. AFCRL-PSRP-402, AFCRL-70-0005
PROJ: AF-5620
TASK: 562009

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE AVIONICS PANEL, TECHNICAL SYMPOSIUM (17TH) TONSBERG (NORWAY) 29 SEP 69.

DESCRIPTORS: (*OPTICAL MATERIALS, *ELECTROOPTICS), (*COPPER COMPOUNDS, CRYSTAL GROWTH), (*MODULATORS, LASERS), CHLORIDES, GELS, LASERS, MODULATION, LIGHT TRANSMISSION (U)
IDENTIFIERS: COPPER CHLORIDES, *LASER MODULATORS (U)

MOST ELECTRO-OPTIC MODULATORS PRESENTLY USED ARE CRYSTALS SUCH AS KDP WHICH EXHIBIT A LONGITUDINAL ELECTRO-OPTIC EFFECT. IT HAS BEEN DEMONSTRATED THAT A MORE EFFICIENT MODULATOR CAN BE PRODUCED WHEN A CRYSTAL HAVING A TRANSVERSE ELECTRO-OPTIC EFFECT IS EMPLOYED. GENERALLY THESE CRYSTALS ARE PRODUCED EITHER FROM THE MELT OR FROM FLUXES. SINCE MELT GROWN CRYSTALS MUST BE COOLED THROUGH SEVERAL HUNDRED DEGREES AND OFTEN MUST UNDERGO PHASE TRANSITIONS, THESE CRYSTALS ARE GENERALLY HIGHLY STRAINED. FLUX GROWN CRYSTALS ARE ALSO UNSATISFACTORY BECAUSE OF THE TENDENCY TO INCORPORATE THE FLUX INTO THE LATTICE. IN THIS PAPER A METHOD OF PRODUCING CRYSTALS WITH A TRANSVERSE ELECTRO-OPTIC EFFECT AT ROOM TEMPERATURE IS PRESENTED WHICH RESULTS IN STRAIN-FREE CRYSTALS OF HIGH PURITY. THE PRINCIPAL MATERIAL DISCUSSED IS CUPROUS CHLORIDE WHICH HAS THE ADDED ADVANTAGE THAT IT HAS TRANSPARENCY IN THE INFRARED RANGE OUT TO AT LEAST TWENTY MICRONS. THE SYSTEM USED FOR THE EVALUATION OF MATERIALS IS DISCUSSED AS WELL AS RESULTS FOR CUPROUS CHLORIDE AND OTHER MATERIALS PRODUCED BY ROOM TEMPERATURE TECHNIQUES. THIS WORK HAS PROVIDED A SIGNIFICANTLY IMPROVED LASER MODULATOR MATERIAL OF POTENTIAL VALUE FOR COMMUNICATION SYSTEMS AND SIMILAR APPLICATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-702 408 17/2
NAVAL ORDNANCE LAB WHITE OAK MD

THE INTERACTION OF CO2 LASER RADIATION AND WATER. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUN 68-JUN 69, JAN 70 22P LOWNEY, JEREMIAH R. ; SULLIVAN, JOHN B. ;
REPT. NO. NOLTR-69-166
PROJ: A37-533/000/WF08-123-702

UNCLASSIFIED REPORT

DESCRIPTORS: (*GAS LASERS, *UNDERWATER SOUND), (*UNDERWATER COMMUNICATION SYSTEMS, GAS LASERS), AIR-TO-UNDERWATER, LIGHT COMMUNICATION SYSTEMS, INTERACTIONS (U)
IDENTIFIERS: CARBON DIOXIDE LASERS (U)

THE OUTPUT OF A CO2 LASER WAS FOCUSSED UPON THE SURFACE OF WATER TO STUDY THE GENERATION OF SONIC WAVES FOR AIR TO WATER COMMUNICATION. A ROTATING MIRROR Q-SWITCH SYSTEM AND AN ELECTRICAL PULSING SYSTEM WERE USED TO OBTAIN LASER PULSES. CONTINUOUS WAVE OUTPUT WAS ALSO INVESTIGATED. IN EACH CASE, THERE WERE THREE OBVIOUS EFFECTS FROM THE INTERACTION (1) GENERATION OF AN ACOUSTIC WAVE IN AIR; (2) GENERATION OF AN ACOUSTIC WAVE IN WATER; AND (3) GENERATION OF A CIRCULAR SURFACE WAVE. THE BEST EFFICIENCY FOR PRODUCING A WATER ACOUSTIC DISTURBANCE WAS ABOUT 10 TO THE -6TH POWER. ONE PART IN 10,000 OF THE ACOUSTIC ENERGY COUPLED INTO THE WATER - THE BALANCE IS DISSIPATED IN THE AIR. PLACING A TRANSPARENT WINDOW ON THE SURFACE ENHANCED THE WATER ACOUSTIC WAVE SO THAT IT WAS COMPARABLE IN ENERGY TO THE AIR ACOUSTIC WAVE. IT IS CONCLUDED THAT THE PROCESS IS VERY LOSSY, ALTHOUGH FURTHER IMPROVEMENTS IN LASER ENGINEERING MAY YIELD BETTER RESULTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-702 944 17/2
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

MOTION PICTURE AND TELEVISION ENGINEERING. VOLUME 13, NUMBER 5, 1969 (SELECTED ARTICLES), (U)

DEC 69 32P ARKADEV,D. I. ;MILINKIS,B. M. ;SOKOLOV,P. L. ;KRUSSER,B. V. ;
REPT. NO. FTD-MT-24-350-69
PROJ: FTD-4160301

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF TEKHNIKA KINO I TELEVIDENIYA (USSR) V13 N5 P52-62 1969, BY JOHN W. ANDERSON, JR.

DESCRIPTORS: (*TELEVISION DISPLAY SYSTEMS, *LASERS), (*IMAGE ORTHICONS, TELEVISION EQUIPMENT), OPTICAL IMAGES, DISTORTION, MODULATION, USSR (U)
IDENTIFIERS: TRANSLATIONS, TELEVISION BROADCASTING (U)

CONTENTS: USE OF LASERS IN TELEVISION; LIGHT AND POTENTIAL CHARACTERISTICS OF IMAGE ORTHICONS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-706 292 17/2 9/4
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

EFFICIENT OPTICAL COMMUNICATION IN A TURBULENT ATMOSPHERE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 70 125P HALME,SEPPO J. ;
REPT. NO. TR-474
CONTRACT: DA-28-043-AMC-02536(E), NGL-22-009-013
PROJ: DA-2-0-061102-B-31-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, ATMOSPHERIC MOTION), LIGHT TRANSMISSION, DETECTION, OPTIMIZATION, NOISE(RADIO), INFORMATION THEORY, LASERS, STATISTICAL DISTRIBUTIONS, PROBABILITY DENSITY FUNCTIONS, THESES (U)

GIVEN A TRANSMITTER THAT RADIATES AN ELECTROMAGNETIC LIGHT FIELD, IT IS ASSUMED THAT THE RESULTING FIELD AT THE PLANE OF THE RECEIVER APERTURE IS LOG-NORMAL WITH SOME COHERENCE PROPERTIES. VARIOUS REPRESENTATIONS OF THE FIELD ARE DISCUSSED: APERTURE SAMPLING, PLANE-WAVE DECOMPOSITION, AND KARHUNEN-LOEVE EXPANSION. THE STATISTICAL PROPERTIES OF THE COEFFICIENTS IN THESE REPRESENTATIONS ARE INVESTIGATED BY ANALYTICAL, SIMULATION, AND EXPERIMENTAL METHODS. BASED ON THESE REPRESENTATIONS THE PROBLEM OF OPTIMUM DETECTION OF AN ORTHOGONAL SIGNAL SET, SUBJECT TO DISTORTION AND NOISE IN THE ATMOSPHERE, IS INVESTIGATED. THE OPTIMUM RECEIVER AND ITS PERFORMANCE ARE EVALUATED AND DISCUSSED IN THE CASES OF LOG-NORMAL AND GAUSSIAN STATISTICS, CLASSICAL AND QUANTUM MODELS, LARGE AND SMALL APERTURES, AND STRONG, WEAK OR ABSENT BACKGROUND NOISE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-707 629 20/5
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL ENGINEERING

SWITCHING OF PHASE-LOCKED STATES IN THE INTRACAVITY PHASE-MODULATED HE-NE LASER, (U)

FEB 69 12P HONG,G. W. ;WHINNERY,J. R. ;

CONTRACT: AF-AFOSR-1488-68
PROJ: AF-4751
MONITOR: AFOSR 70-1677TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN IEEE JNL. OF QUANTUM ELECTRONICS, VQE-5 N7 P367-376 JUL 69.

DESCRIPTORS: (*GAS LASERS, PHASE-LOCKED SYSTEMS), PHASE MODULATION, HELIUM, NEON, ISOTOPES, FREQUENCY MODULATION (U)
IDENTIFIERS: *HELIUM NEON LASERS, SWITCHING (U)

IT IS KNOWN THAT THERE EXIST TWO SOLUTIONS FOR THE HE-NE LASER PHASE LOCKED BY SYNCHRONOUS INTERNAL PHASE MODULATION. ONE CORRESPONDS TO A PHASE DIFFERENCE BETWEEN ADJACENT MODES OF EVEN INTEGERS OF PI (EVEN STATE) AND THE OTHER TO ODD INTEGERS OF PI (ODD STATE). ALTHOUGH THEIR FREQUENCY POWER SPECTRA IN GENERAL LOOK SIMILAR, THEY APPEAR IN THE TIME RESPONSE AS TWO DIFFERENT SETS OF PULSE TRAINS 180 DEG OUT OF PHASE WITH RESPECT TO EACH OTHER. OF THE TWO, FOR A GIVEN SET OF CONDITIONS, IT HAS NOT YET BEEN POSSIBLE TO PREDICT WHICH STATE WILL OSCILLATE. IT WAS FOUND THAT, IF THE MODULATION FREQUENCY IS FIXED SLIGHTLY HIGHER THAN THE AVERAGE AXIAL-MODE SPACING NEAR THE LINE CENTER, THE TWO STATES CAN BE CONTROLLED BY VARYING THE AMPLITUDE OF THE MODULATION SIGNAL, RESULTING IN A SWITCHING ACTION BETWEEN THE TWO STATES. FURTHERMORE, IT WAS FOUND THAT IN A NARROW REGION OF 'DETUNING' AND IN A SMALL RANGE OF MODULATION AMPLITUDES, BOTH STATES OSCILLATE SIMULTANEOUSLY. THE ABOVE RESULTS WERE ANALYZED BY CONSIDERING THE ASSYMMETRY IN THE FREQUENCY CHARACTERISTICS OF THE GAIN MEDIUM DUE TO THE PRESENCE OF THE ISOTOPE NE22 IN THE HE-NE MIXTURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-707 861 20/6
RAND CORP SANTA MONICA CALIF

PROPAGATION OF A FINITE OPTICAL BEAM IN AN INHOMOGENEOUS MEDIUM, (U)

APR 70 41P LUTOMIRSKI,R. F. ;
REPT. NO. RM-6055-ARPA
CONTRACT: DAHC15-67-C-0141, ARPA ORDER-189-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*ATMOSPHERIC MOTION, LIGHT TRANSMISSION), (*COHERENT RADIATION, DIFFRACTION), LIGHT COMMUNICATION SYSTEMS, RANGE FINDING, TARGET ACQUISITION, REFRACTIVE INDEX, GAS LASERS, IRASERS (U)

THE MEMORANDUM IS PART OF A STUDY OF THE EFFECT OF ATMOSPHERIC TURBULENCE ON OPTICAL AND INFRARED RECONNAISSANCE AND GUIDANCE EQUIPMENT. A QUANTITATIVE UNDERSTANDING OF THE MANNER IN WHICH AN INITIALLY COHERENT BEAM OF FINITE CROSS SECTION PROPAGATES IS REQUIRED FOR THE PREDICTION OF THE PERFORMANCE OF VARIOUS DEVICES EMPLOYING LASERS FOR TARGET ACQUISITION OR GUIDANCE IN TACTICAL MISSIONS, OPTICAL COMMUNICATION SYSTEMS, AND OTHER DEVICES. THE MEMORANDUM CALCULATES THE MEAN INTENSITY DISTRIBUTION FOR AN ARBITRARY AMPLITUDE AND PHASE DISTRIBUTION IN A FINITE APERTURE IN BOTH THE NEAR AND FAR FIELD AND EXAMINES IN DETAIL THE CASE OF A UNIFORM DISTRIBUTION ACROSS A CIRCULAR APERTURE. THE RESULTS SHOULD BE OF USE TO THOSE INTERESTED IN PROPAGATION THEORY AND ITS APPLICATIONS TO LASER RANGE FINDERS, LASER LINE SCANNERS, COMMUNICATION SYSTEMS, AND VARIOUS GUIDANCE AND OTHER SYSTEMS EMPLOYING AN ILLUMINATING BEAM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-707 948 17/2 20/6 17/5 17/8
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

EFFICIENT ANALOG COMMUNICATION OVER QUANTUM CHANNELS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 70 112P PERSONICK,STEWART D. ;
REPT. NO. TR-477
CONTRACT: DA-28-043-AMC-02536(E), NGL-22-009-013
PROJ: DA-2-0-061102-B-31-F

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, FEASIBILITY STUDIES), (*COHERENT RADIATION, LIGHT TRANSMISSION), (*PHOTONS, COUNTING METHODS), INFORMATION THEORY, QUANTUM MECHANICS, ANALOG SYSTEMS, THESES (U)
IDENTIFIERS: STATISTICAL DECISION THEORY (U)

THE REPORT IS CONCERNED WITH THE INCORPORATION OF THE AXIOMS OF QUANTUM MEASUREMENTS INTO CURRENT COMMUNICATION ESTIMATION THEORY. IT IS WELL KNOWN THAT CLASSICAL ELECTROMAGNETIC THEORY DOES NOT ADEQUATELY DESCRIBE FIELDS AT OPTICAL FREQUENCIES. THE ADVENT OF THE LASER HAS MADE THE USE OF OPTICAL CARRIERS FOR INFORMATION TRANSMISSION PRACTICAL. CLASSICAL COMMUNICATION ESTIMATION THEORY EMPHASIZES BACKGROUND NOISE AND CHANNEL FADING AS PRIMARY LIMITATIONS ON SYSTEM PERFORMANCE. AT OPTICAL FREQUENCIES, QUANTUM EFFECTS MAY TOTALLY DOMINATE PERFORMANCE. ESTIMATION THEORY IS FORMULATED USING THE QUANTUM THEORY SO THAT THIS TYPE OF SYSTEM LIMITATION CAN BE UNDERSTOOD, AND OPTIMAL RECEIVERS AND SYSTEMS DESIGNED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-708 677 17/2 9/5
SIGNALS RESEARCH AND DEVELOPMENT ESTABLISHMENT
CHRISTCHURCH (ENGLAND)

A 1 KM RANGE OPTICAL LINK FOR VIDEO SIGNALS INCORPORATING A SIMPLE AGC AND TEMPERATURE COMPENSATION CIRCUIT FOR AVALANCHE PHOTODIODES, (U)

APR 70 10P DORE,M. J. ;
REPT. NO. SRDE-70018
MONITOR: TRC BR-19358

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, FEASIBILITY STUDIES), AUTOMATIC GAIN CONTROL, GALLIUM ARSENIDES, SILICON, INFRARED DETECTORS, LASERS, PHOTODIODES, GREAT BRITAIN (U)
IDENTIFIERS: GALLIUM ARSENIDE LASERS (U)

GALLIUM ARSENIDE LAMPS AND SILICON AVALANCHE DETECTORS ARE RELIABLE COMPONENTS FOR OPTICAL COMMUNICATION. IT HAS BEEN SHOWN THAT DIRECT ANALOGUE MODULATION IS PROBABLY THE BEST APPROACH TO A 1KM RANGE OPTICAL COMMUNICATION LINK FOR VIDEO BANDWITHS. THIS MEMORANDUM DESCRIBES BRIEFLY EXPERIMENTAL TERMINALS FOR SUCH A LINK. LABORATORY MEASUREMENT INDICATED THAT A CLEAR WEATHER 'IN HAND' FACTOR OF 13DB OR MORE ABOVE THE 30DB S/N RATIO NEEDED SHOULD BE ACHIEVED RESULTING IN AN EXPECTED OUTAGE TIME OF LESS THAN 10 DAYS PER YEAR. A SIMPLE AGC AND TEMPERATURE STABILIZATION CIRCUIT FOR AVALANCHE DIODES IS DESCRIBED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-708 896 20/5
AVCO EVERETT RESEARCH LAB EVERETT MASS

LASER BEAM TRANSMISSION THROUGH THE ATMOSPHERE. (U)

DESCRIPTIVE NOTE: RESEARCH REPT.,
MAR 70 46P WALLACE,J. , JR.;CAMAC,M.
;
REPT. NO. AERL-RR-347
CONTRACT: F29601-69-C-0060
PROJ: AF-5326

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, IONOSPHERIC PROPAGATION), COHERENT RADIATION, ELECTROMAGNETIC WAVES, REFRACTIVE INDEX, ABSORPTION, CARBON DIOXIDE, ATMOSPHERIC REFRACTION (U)

THEORETICAL EVALUATION OF THE TRANSMISSION OF A LASER BEAM AT 10.6 MICRONS HAS BEEN INVESTIGATED USING THE TECHNIQUES OF GEOMETRIC OPTICS. THE INTERACTION IS NON-LINEAR BECAUSE THE REFRACTIVE INDEX DEPENDS THROUGH THE MECHANISM OF ABSORPTION, UPON THE INTENSITY OF THE PROPAGATING WAVE. ATMOSPHERIC ABSORPTION AT 10.6 MICRONS IS CAUSED BY CO2 AND H2O IN THE ATMOSPHERE. ASSOCIATED WITH ABSORPTION BY CO2 AND TRANSVERSE FLOW CAUSED BY ATMOSPHERIC WINDS OR BEAM MOTION ARE VIBRATIONAL RELAXATION EFFECTS WHICH CAN EITHER HEAT OR COOL THE ATMOSPHERE. IF THE ATMOSPHERE IS COOLED, THE BEAM IS SELF-FOCUSED. THE VELOCITY-ALTITUDE DEPENDENCE OF HEATING AND COOLING REGIMES ARE DEFINED AND DETAILED INTENSITY DISTRIBUTIONS IN EACH REGIME ARE PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-709 434 20/5 4/1
INSTITUTE FOR DEFENSE ANALYSES ARLINGTON VA SCIENCE AND TECHNOLOGY DIV

DESCRIPTION OF ATMOSPHERIC TURBULENCE FOR LINEAR PROPAGATION OF LASER BEAMS. (U)

DESCRIPTIVE NOTE: RESEARCH PAPER,
JUL 70 75P HIDALGO,HENRY ;VAGLIO-LAURIN,ROBERTO ;
REPT. NO. RP-P-600
CONTRACT: DAHC15-67-C-0011
MONITOR: IDA/HQ 70-11343

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, LIGHT TRANSMISSION), (*LIGHT TRANSMISSION, *ATMOSPHERIC MOTION), BOUNDARY LAYER, ATMOSPHERIC REFRACTION, PROPAGATION, SIGNALS, SCATTERING (U)

THE PAPER CONSIDERS THE FLUID MECHANICAL ASPECTS AND DATA RELEVANT TO THE PROPAGATION OF LOW POWER-DENSITY LASERS IN THE ATMOSPHERIC BOUNDARY LAYER. ITS SCOPE INCLUDES THE FOLLOWING TOPICS: (A) FORMULATION OF THE ROLE OF THE TURBULENT STRUCTURE IN DETERMINING PHASE AND AMPLITUDE CHARACTERISTICS OF RECEIVED SIGNALS, WITH EMPHASIS ON SINGLE SCATTERING SITUATIONS, (B) REVIEW OF AVAILABLE FLUID MECHANICAL DATA FOR MEAN AND FLUCTUATING FLOW PROPERTIES FOR VARIOUS ATMOSPHERIC CONDITIONS, (C) IDENTIFICATION OF THE ATMOSPHERIC CONDITIONS THAT REQUIRE COMPLEMENTARY FLUID MECHANICAL MEASUREMENTS, AND (D) PROBLEM AREAS THAT NEED FURTHER THEORETICAL INVESTIGATIONS CONCERNING THE EFFECT OF ATMOSPHERIC TURBULENCE ON OPTICAL WAVE PROPAGATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-709 579 20/5 20/6
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

DETERMINATION OF ATMOSPHERICALLY INDUCED PHASE FLUCTUATIONS BY LONG DISTANCE INTERFEROMETRY AT 6328 A. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 70 21P BUSER,RUDOLF G. ;BORN,
GUNTHARD K. ;
REPT. NO. ECOM-3283
PROJ: DA-1-T-061102-B-31-A
TASK: 1-T-061102-B-31-A-01

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT TRANSMISSION, PHASE DISTORTION), LIGHT COMMUNICATION SYSTEMS, INTERFEROMETERS, GAS LASERS, ATMOSPHERIC MOTION (U)
IDENTIFIERS: HELIUM NEON LASERS (U)

EXPERIMENTAL VALUES OF ATMOSPHERICALLY INDUCED PHASE FLUCTUATIONS HAVE BEEN OBTAINED FOR VARIOUS PATHLENGTHS USING A NEAR-GROUND HORIZONTAL MACH-ZEHNDER SETUP AT 6328 A. INDEPENDENT DETERMINATION OF THE STRUCTURE FUNCTION CONSTANT OF THE REFRACTIVE INDEX AND OTHER RELEVANT PARAMETERS PERMITTED A CLEAR DEFINITION OF PREVAILING METEOROLOGICAL CONDITIONS. IT IS FOUND THAT FOR LOW TURBULENCE, OR STRONG TURBULENCE AND SHORT PATHLENGTH, TATARSKI'S THEORY GENERALLY UNDER-ESTIMATES THE VALUES OF THE OBSERVED RMS PHASE FLUCTUATIONS. FOR HIGHER TURBULENCE NO CONTINUOUS PHASE INFORMATION IS DIRECTLY OBTAINABLE, AND THE CONCEPT OF PHASE STRUCTURE FUNCTION BECOMES EXPERIMENTALLY UNDEFINED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-710 178 20/5 17/2
TECHNION RESEARCH AND DEVELOPMENT FOUNDATION LTD HAIFA (ISRAEL)

SPECTROSCOPIC STUDIES WITH A TUNABLE N2O LASER. (U)

SEP 69 5P OPPENHEIM,URI P. ;MELMAN, PAUL ;

CONTRACT: EOOAR-69-0053
PROJ: AF-9750
TASK: 975001
MONITOR: AFOSR 70-2115TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF THE OPTICAL SOCIETY OF AMERICA, V60 N3 P332-334 MAR 70.

DESCRIPTORS: (*GAS LASERS, *NITROGEN OXIDES), (*LIGHT COMMUNICATION SYSTEMS, GAS LASERS), INFRARED COMMUNICATION SYSTEMS, ISRAEL (U)
IDENTIFIERS: *NITROGEN OXIDE LASERS, NITROGEN OXIDE(N2O), *TUNABLE LASERS (U)

AN N2O LASER IS DESCRIBED WHICH IS TUNABLE OVER 65 ROTATIONAL LINES OF THE 001-100 BAND. A SIMPLE METHOD IS USED TO DETERMINE THE CAVITY LOSSES OF THIS LASER. ABSORPTION OF A NUMBER OF N2O LINES BY THE 001-100 BAND OF CO2 IS DEMONSTRATED. THE P (20) LINE OF N2O IS OBSERVED AFTER ATTENUATION BY A LONG PATH OF N2O AT 125-TORR PRESSURE AND THE PEAK ABSORPTION COEFFICIENT FOR THIS LINE IS FOUND TO BE 0.0094/CM AT 300 K. THE N2O LASER HAS A CERTAIN ADVANTAGE OVER THE CO2 LASER FOR LONG-RANGE COMMUNICATIONS THROUGH THE ATMOSPHERE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-710 712 20/6 20/12
CALIFORNIA INST OF TECH PASADENA DIV OF ENGINEERING AND APPLIED SCIENCE

OPTICAL GUIDING AND ELECTRO-OPTIC MODULATION IN GAAS EPITAXIAL LAYERS, (U)

APR 70 3P HALL,DAVID ;YARIV,AMNON ; GARMIRE,ELSA ;

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN OPTICS COMMUNICATIONS, V1 N9 P403-405 APR 70.
SUPPLEMENTARY NOTE: SPONSORED IN PART BY THE OFFICE OF NAVAL RESEARCH, WASHINGTON, D. C.

DESCRIPTORS: (*GALLIUM ARSENIDES, *ELECTROOPTICS), (*INFRARED RADIATION, MODULATION), SEMICONDUCTING FILMS, EPITAXIAL GROWTH, WAVEGUIDES, LASERS (U)

SINGLE MODE TE OR TM PROPAGATION IS DEMONSTRATED IN AN OPTICAL WAVEGUIDE CONSISTING OF A HIGH RESISTIVITY SEMICONDUCTOR (GAAS) LAYER (ABOUT 10 MICROMETERS) WHICH IS SANDWICHED BETWEEN A METAL FILM AND A LOWER RESISTIVITY SEMICONDUCTOR. A REVERSE BIAS APPLIED TO THE METAL-SEMICONDUCTOR SCHOTTKY BARRIER CAUSES AN ELECTRO-OPTIC RETARDATION (OR, IN GENERAL, PHASE VARIATION) WHICH CAN BE USED FOR MODULATION PURPOSES. AMPLITUDE MODULATION WITH A 'HALF-VOLTAGE' V SUB (1/2) = 84 VOLTS IS DEMONSTRATED AT LAMBDA SUB 0 = 1.15 MICROMETERS WITH A SAMPLE 2.4 MM LONG. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-710 946 17/2 20/5
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

AN INFORMATION FEEDBACK APPROACH APPLIED TO AN AMPLITUDE-MODULATED DIGITAL LASER COMMUNICATIONS SYSTEM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 70 97P DWORKIN,LARRY U. ;
REPT. NO. ECOM-3258
PROJ: DA-5016118443001

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, FEEDBACK), DIGITAL SYSTEMS, DIGITAL COMPUTERS, AMPLITUDE MODULATION, INFORMATION THEORY, MONTE CARLO METHOD, LASERS, PHOTONS, COUNT-RATE METERS, ATTENUATION (U)
IDENTIFIERS: *LASER COMMUNICATION SYSTEMS (U)

THE USE OF PREDECISION FEEDBACK IN A LASER COMMUNICATION SYSTEM EMPLOYING AN AMPLITUDE-MODULATED LASER TRANSMITTER AND PHOTOMULTIPLIER RECEIVER IS CONSIDERED. POISSON STATISTICS ARE USED TO DESCRIBE THE DISTRIBUTION OF EMITTED PHOTO ELECTRONS IN A FIXED TIME INTERVAL FROM THE PHOTO EMISSIVE SURFACE OF THE RECEIVER WHEN THE INCIDENT FIELD IS A MIXTURE OF A SINGLE MODE LASER AND BROADBAND THERMAL NOISE. THE USE OF A NOISELESS FEEDBACK PATH TO REDUCE THE VARIANCE OF THE RECEIVED PHOTO ELECTRON COUNT IS EXAMINED. A TECHNIQUE KNOWN AS 'FEEDBACK AVERAGING' IS CONCEIVED AND THE FOLLOWING PROPERTIES ARE DEMONSTRATED. (A) THE VARIANCE OF THE RECEIVED PHOTO ELECTRON COUNTS IS SIGNIFICANTLY REDUCED OVER THAT OBTAINED IN A SYSTEM WITHOUT FEEDBACK. (B) THE EFFECTS OF BACKGROUND RADIATION AND SHOT NOISE AT THE RECEIVER CAN BE REDUCED. (C) THE EFFECT OF SLOW FADING ON THE MEAN ARRIVAL RATE OF PHOTONS IS REDUCED. THIS IS ACHIEVED IN THE ABOVE SYSTEM WITH THE SAME AVERAGE POWER AND ONLY SLIGHTLY MORE PEAK POWER, IN MOST CASES, THAN THE SAME SYSTEM WITHOUT FEEDBACK. THE APPROACH IS TREATED ANALYTICALLY, AND SIMULATED ON A DIGITAL COMPUTER. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-710 955 17/2 20/5
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

AN INFORMATION FEEDBACK APPROACH APPLIED TO POLARIZATION-MODULATED LASER COMMUNICATION SYSTEMS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 70 26P DWORKIN,LARRY U. ;
REPT. NO. ECOM-3314
PROJ: DA-5016118443001, DA-A-91-A-3801

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS FROM POLYTECHNIC INST. OF BROOKLYN, N. Y.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, FEEDBACK), DIGITAL SYSTEMS, DIGITAL COMPUTERS, INFORMATION THEORY, PHOTONS, COUNT-RATE METERS, ATTENUATION, LASERS, POLARIZATION, THESES (U)
IDENTIFIERS: *LASER COMMUNICATION SYSTEMS, *POLARIZATION MODULATION (U)

THE USE OF AN INFORMATION FEEDBACK PROCEDURE, CALLED 'FEEDBACK AVERAGING' IS APPLIED TO AN M-ARY POLARIZATION MODULATED LASER COMMUNICATION SYSTEM. THE SYSTEMS WITH AND WITHOUT FEEDBACK, THAT ARE LIMITED BY PHOTON FLUCTUATION, ARE CONSIDERED AND COMPARED. A SIGNIFICANT IMPROVEMENT IN ERROR RATE OF A SYSTEM WITH FEEDBACK IS DEMONSTRATED OVER A ONE-WAY SYSTEM FOR A QUATERNARY SYSTEM SUBJECT TO INTENSITY CONSTRAINT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-710 956 17/2 20/5
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

AN EXPERIMENTAL FEEDBACK AVERAGING LASER COMMUNICATIONS SYSTEM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 70 25P DWORKIN,LARRY U. ;
REPT. NO. ECOM-3315
PROJ: DA-5016118443001, AD-A-91-3901

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS FROM POLYTECHNIC INST. OF BROOKLYN, N. Y.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, AMPLITUDE MODULATION), GAS LASERS, ATTENUATORS, PHOTOMULTIPLIERS, PHOTONS, COUNT-RATE METERS, THESES (U)
IDENTIFIERS: *LASER COMMUNICATION SYSTEMS, HELIUM NEON LASERS (U)

AN EXPERIMENTAL VERSION OF A 'FEEDBACK AVERAGING' AMPLITUDE MODULATED LASER COMMUNICATIONS SYSTEM IS DISCUSSED. THE ABILITY OF THE SYSTEM TO REDUCE THE VARIANCE OF PHOTON ARRIVALS IS DEMONSTRATED EXPERIMENTALLY. PROPERTIES OF A RECEIVER ESTIMATOR CALCULATED IN PREVIOUSLY PUBLISHED REPORTS ARE VERIFIED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-714 358 20/6 20/5
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV O PHYSICS

PRODUCTION OF SUBNANOSECOND LIGHT PULSES WITH THE AID OF A LASER-TRIGGERED SPARK GAP, (U)

JUN 70 4P ALCOCK, A. J. ;RICHARDSON, M. C. ;
MONITOR: NRC 11487

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN OPTICS COMMUNICATIONS, V2 N2 P65-68 JUL 70. NO COPIES FURNISHED.

DESCRIPTORS: (*LIGHT PULSES, LASERS), ELECTROOPTICS, LIGHT TRANSMISSION, LIGHT COMMUNICATION SYSTEMS, CANADA (U)
IDENTIFIERS: SPARK GAPS, RUBY LASERS (U)

SUBNANOSECOND PULSES, HAVING RISE AND FALL TIMES NOT EXCEEDING 300 PSEC, HAVE BEEN SELECTED FROM THE OUTPUT OF A SINGLE MODE RUBY LASER. THE PULSE WIDTH, APPROXIMATELY 700 PSEC, AGREES WELL WITH THE OBSERVED BROADENING OF THE SPECTRUM OF THE PULSE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-714 718 17/2 20/5
GEORGETOWN UNIV WASHINGTON D C DEPT OF PHYSICS

FREQUENCY-MODULATED LASER COMMUNICATION SYSTEM. (U)

OCT 69 5P BORSUK,GERALD M. ;THALER, WILLIAM J. ;

CONTRACT: F44620-68-C-0017
PROJ: AF-7921
MONITOR: AFOSR 70-2611TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN IEEE TRANSACTIONS ON SONICS AND ULTRASONICS, VSU-17 N4 P207-209 OCT 70.

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, GAS LASERS), (*GAS LASERS, FREQUENCY MODULATION), VIDEO SIGNALS, ULTRASONIC RADIATION, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: HELIUM NEON LASERS, ACOUSTOOPTIC INTERACTIONS (U)

AN ULTRASONIC MODULATION CELL UTILIZING THE RAMAN-NATH EFFECT IS USED TO IMPRESS A FREQUENCY-MODULATED VIDEO SIGNAL ON A HELIUM-NEON LASER CARRIER. A LONGITUDINAL ULTRASONIC WAVE PROPAGATING IN THE ULTRASONIC MODULATION CELL EFFECTIVELY ACTS AS A DOPPLER SHIFTING PHASE GRATING FOR COLLIMATED MONOCHROMATIC-LIGHT INCIDENT NORMAL TO THE DIRECTION OF PROPAGATION OF THE ULTRASONIC WAVE. A TECHNIQUE HAS BEEN DEVELOPED BY WHICH TWO ULTRASONIC ELEMENTS PRODUCE A PSEUDOSTANDING WAVE AT THE VARIOUS MODULATING FREQUENCIES IMPOSED ON THE ELEMENTS. ALL DOPPLER-SHIFTED FREQUENCY COMPONENTS IN THE LASER BEAM ARE SCATTERED BACK INTO THE ZERO ORDER. AN OPTICAL HETERODYNE DETECTOR AND FM DISCRIMINATOR ARE USED TO RECOVER THE SIGNAL. THE ABILITY TO FREQUENCY MULTIPLEX DISTINCT CHANNELS ONTO THE LASER BEAM, USING ACOUSTIC UNITS IN TANDEM, IS DEMONSTRATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-714 895 20/5
BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS

PROBLEMS IN THE THEORY OF LASER MODULATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
OCT 70 20P FOX,H. L. ;
REPT. NO. BBN-2060
CONTRACT: N00014-68-C-0199

UNCLASSIFIED REPORT

DESCRIPTORS: (*GAS LASERS, COHERENT RADIATION), (*COHERENT RADIATION, MODULATION), ATOMIC ENERGY LEVELS, ZEEMAN EFFECT, MATHEMATICAL ANALYSIS, QUANTUM MECHANICS, LIGHT TRANSMISSION, ELECTROOPTICS (U)
IDENTIFIERS: HELIUM NEON LASERS, *QUANTUM ELECTRONICS (U)

THE REPORT DISCUSSES THE PROBLEM OF INTRINSIC INTERNAL MODULATION OF A LASER - MODULATION BY ALTERING THE STATE OF THE ACTIVE LASER MEDIUM. CONTROLLED MODULATION FOR INFORMATION TRANSMISSION AND UNCONTROLLED NOISE-PRODUCING MODULATIONS ARE CONSIDERED. TO DEMONSTRATE A CORRESPONDENCE-PRINCIPLE DERIVATION OF THE CLASSICAL LASER EQUATIONS OF LAMB, IT IS SHOWN THAT THE LIFETIME DISTORTIONS PREVIOUSLY REPORTED MUST BE INCLUDED IN A QUANTUM TREATMENT. THE PROBLEM OF SOUND WAVES AND TIME-DEPENDENT ZEEMAN-EFFECT MODULATION IS DISCUSSED. (AUTHOR) (U)

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-716 847 20/5
CALIFORNIA UNIV IRVINE SCHOOL OF ENGINEERING

INVESTIGATION OF SPECTRAL AND STATISTICAL PROPERTIES OF SINGLE-MODE CW LASERS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUL 69-30 JUN 70,
JUL 70 46P GAMO,HIDEYA ;CHUANG,SHIH-SHUNG ;
CONTRACT: F19628-69-C-0147
PROJ: AF-4645
TASK: 464502
MONITOR: AFCRL 70-0468

UNCLASSIFIED REPORT

DESCRIPTORS: (*GAS LASERS, POWER SPECTRA), CARBON DIOXIDE, IRASERS, SPECTRA(INFRARED), STOCHASTIC PROCESSES, PROBABILITY DENSITY FUNCTIONS, LIGHT COMMUNICATION SYSTEMS (U)
IDENTIFIERS: *CARBON DIOXIDE LASERS, CONTINUOUS WAVE LASERS, VAN DER POL DIFFERENTIAL EQUATION (U)

VARIANCE AND POWER SPECTRA OF INTENSITY FLUCTUATIONS OF A SINGLE MODE CW CO2 10.6 MICRON GAS LASER HAVE BEEN MEASURED BY USING A COPPER-DOPED GERMANIUM DETECTOR AND ANALOG INSTRUMENTATION. RMS INTENSITY FLUCTUATIONS ABOVE THE OSCILLATION THRESHOLD WAS SMALLER THAN 0.3% OF THE AVERAGE INTENSITY. THE MEASUREMENTS NEAR THE OSCILLATION THRESHOLD, HOWEVER, WERE NOT ACCURATE, BECAUSE THE ACOUSTIC DISTURBANCE DUE TO ACOUSTICAL NOISE, BUBBLES IN THE COOLING WATER AND TEMPERATURE FLUCTUATIONS IN THE PLASMA TUBE WERE PREODIMINANT OVER THE FLUCTUATIONS DUE TO SPONTANEOUS EMISSION. THE POWER SPECTRUM OBSERVED AT FREQUENCIES ABOVE 10KHZ SHOWED FEATURES CHARACTERISTIC TO THE LASER MODEL OF VAN DER POL OSCILLATOR DRIVEN BY THE RANDOM NOISE. IMPROVEMENTS OF CO2 GAS LASER DESIRABLE FOR FURTHER INVESTIGATION ARE DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-716 876 20/5
ILLINOIS UNIV URBANA GASEOUS ELECTRONICS LAB

FREQUENCY SHIFT AT 3.39 MICRONS DUE TO COMPETITION BY 6328-A LASER RADIATION, (U)

APR 69 4P KU,R. T. ;VERDEYEN,J. T. ;CHERRINGTON,B. E. ;

CONTRACT: AF 33(615)-5248
PROJ: AF-7073
TASK: 707300
MONITOR: ARL 70-0289W

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS, V40 N9 P3861-3862 AUG 69.

DESCRIPTORS: (*GAS LASERS, AMPLITUDE MODULATION), (*INFRARED RADIATION, FREQUENCY SHIFT), HELIUM, NEON, GAIN, INTERACTIONS, DEMODULATION (U)
IDENTIFIERS: *HELIUM NEON LASERS (U)

REPORTED ARE THE RESULTS OF A RELATED INVESTIGATION IN WHICH THE FREQUENCY OF A MODE OSCILLATING AT 3.39 MICROMETERS IS SHIFTED DUE TO AMPLITUDE MODULATION OF THE MODES AT 6328A. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-720 937 20/6 17/2
SIGNALS RESEARCH AND DEVELOPMENT ESTABLISHMENT
CHRISTCHURCH (ENGLAND)

DETERMINATION OF THE SCATTERING LOSS IN OPTICAL GLASS FIBRES. (U)

DEC 70 28P ORSBORNE, MARGARET A.

REPT. NO. SRDE-70064
MONITOR: TRC BR-23407

UNCLASSIFIED REPORT

DESCRIPTORS: (*FIBER OPTICS, LIGHT TRANSMISSION), (*LIGHT COMMUNICATION SYSTEMS, TRANSMISSION LINES), SCATTERING, GAIN, POWER SPECTRA, TEST METHODS, TEST EQUIPMENT, GREAT BRITAIN (U)

THE PAPER DESCRIBES THE EQUIPMENT AND METHOD USED TO DETERMINE THE TOTAL LOSS OF POWER DUE TO ALL FORMS OF SCATTER WITHIN MULTIMODE OPTICAL GLASS FIBRES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-721 372 20/5 17/2
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF ELECTRICAL ENGINEERING

THE BEHAVIOR OF LASER MODES IN A MEDIUM WITH TIME VARYING DIELECTRIC CONSTANT. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 70 170P WHITNEY,COLIN GORDON ;
REPT. NO. TR-9
CONTRACT: DA-31-124-ARO(D)-92, SD-90
PROJ: DA-2-0-01051-B-700
MONITOR: AROD 4109:12-P

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, FREQUENCY MODULATION), (*IRASERS, LIGHT COMMUNICATION SYSTEMS), ULTRASONIC RADIATION, FREQUENCY SHIFT CONVERTERS, GALLIUM ARSENIDES, PARTIAL DIFFERENTIAL EQUATIONS, DIELECTRIC PROPERTIES, GAIN, AMPLITUDE MODULATION, THESES (U)
IDENTIFIERS: *GALLIUM ARSENIDE LASERS, *SEMICONDUCTOR LASERS, INJECTION LASERS (U)

THE EFFECT, ON SEMICONDUCTOR LASER MODES, OF A TIME-VARYING MODULATION OF THE COMPLEX DIELECTRIC CONSTANT OF THE ACTIVE REGION OF THE LASER, IS CONSIDERED. IT IS SEEN THAT THE MAIN EFFECT IS TO PRODUCE FREQUENCY MODULATION ASSOCIATED WITH MODULATION OF THE REAL PART OF THE DIELECTRIC CONSTANT WHILE MODULATION OF THE IMAGINARY PART GIVES RISE TO AMPLITUDE MODULATION. TWO METHODS FOR PRODUCING THE MODULATION ARE CONSIDERED. THE FIRST, PRESSURE VIA ULTRASONIC WAVES, PRODUCES PURE FREQUENCY MODULATION IN IMPURE MATERIAL. THE SECOND, MODULATION OF THE INJECTION, RESULTS IN BOTH AMPLITUDE AND FREQUENCY MODULATION. EXPERIMENTS TO CONFIRM THIS ANALYSIS WERE CARRIED OUT ON A CW GAAS INJECTION LASER. THE MODULATED LASER SPECTRUM WAS OBSERVED WITH A FABRY-PEROT INTERFEROMETER. HIGH RESOLUTION MEASUREMENTS ON THE PULSED SPECTRAL SHIFT OF A GAAS LASER AT 77K AND 4.2K WERE PERFORMED USING A FABRY-PEROT INTERFEROMETER. THE FEASIBILITY OF DETECTING MODULATION ON A PULSED SEMICONDUCTOR LASER WAS DEMONSTRATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-722 308 17/2
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

MOTION PICTURE AND TELEVISION ENGINEERING. VOLUME 14, NUMBER 6, 1970 (SELECTED ARTICLES), (U)

JAN 71 24P RAPOPORT,B. I. ;VAINSHTEIN, G. G. ;
REPT. NO. FTD-MT-24-297-70

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF TEKHNIKA KINO I TELEVIDENIYA (USSR) V14 N6 P51-57 1970, BY RENE E. COURVILLE.

DESCRIPTORS: (*TELEVISION COMMUNICATION SYSTEMS, GRAPHICS), (*STEREOSCOPIC DISPLAY SYSTEMS, TELEVISION COMMUNICATION SYSTEMS), SCANING, LASERS, USSR (U)
IDENTIFIERS: TRANSLATIONS, *HOLOGRAPHY (U)

DISCUSSED ARE POSSIBILITIES OF DESIGNING A HOLOGRAPHIC TELEVISION SYSTEM. GIVEN ARE EXPERIMENTAL TEST RESULTS OF THE SYSTEM DURING THE LONG IMAGE DURATION AND ALSO THE PROSPECTS OF USING SPECIAL TELEVISION SYSTEMS WITH THE TRACKING SCANNING FOR CONTOUR IMAGE TRANSMISSION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-722 475 20/6
HUGHES AIRCRAFT CO MALIBU CALIF

RESEARCH IN INTERACTION OF COHERENT LIGHT WITH SOLIDS AND WITH TURBULENT ATMOSPHERES. (U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT.,
FEB 71 238P BROWN,W. P. ;
CONTRACT: AF 49(638)-1607
MONITOR: AFOSR TR-71-0582

UNCLASSIFIED REPORT

DESCRIPTORS: (*COHERENT RADIATION, LIGHT TRANSMISSION), (*LIGHT TRANSMISSION- MATHEMATICAL ANALYSIS), INTERACTIONS, TURBULENCE, SCATTERING, REFRACTIVE INDEX, PARTIAL DIFFERENTIAL EQUATIONS, BOUNDARY VALUE PROBLEMS, LASERS, DIFFRACTION, APPROXIMATION(MATHEMATICS) (U)
IDENTIFIERS: ATMOSPHERIC ATTENUATION, RYTOV APPROXIMATION, BORN APPROXIMATION (U)

THE REPORT SUMMARIZES THE OBJECTIVES AND RESULTS OF RESEARCH ON PROPAGATION IN RANDOM MEDIA CONDUCTED ON CONTRACT AF49(638)-1607. THE PRINCIPAL RESULTS INCLUDE THE DERIVATION OF A VALIDITY CONDITION FOR THE RYTOV APPROXIMATION, THE DEVELOPMENT OF DIAGRAMMATIC SUMMATION TECHNIQUES FOR TREATING MULTIPLE SCATTERING EFFECTS, AND THE DEVELOPMENT OF NONDIAGRAMMATIC TECHNIQUES FOR DERIVING EQUATIONS FOR THE STATISTICAL MOMENTS OF A WAVE PROPAGATING THROUGH A RANDOM MEDIUM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-722 865 20/12
CITY COLL RESEARCH FOUNDATION NEW YORK

OPTICAL PROPERTIES OF SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT. 1 JAN 69-31 MAR 71,
APR 71 85P TZOAR,NARKIS ;
CONTRACT: AF-AFOSR-1676-69
PROJ: AF-9763
TASK: 976302
MONITOR: AFOSR TR-71-1095

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, OPTICAL PROPERTIES), (*BAND THEORY OF SOLIDS, SEMICONDUCTORS), ELECTRICAL CONDUCTANCE, DIELECTRIC PROPERTIES, RAMAN SPECTROSCOPY, IRASERS, CYCLOTRON RESONANCE PHENOMENA, MAGNETIC FIELDS, LIGHT TRANSMISSION, PLASMA MEDIUM, X RAYS, PHONONS (U)
IDENTIFIERS: RAMAN SCATTERING, ELECTRON PHONON INTERACTIONS, SOLID STATE PLASMAS, ELECTRON GAS, PLASMONS (U)

THE PROGRAM OF INVESTIGATIONS WAS DESIGNED TO LEAD TO A BETTER UNDERSTANDING OF THE ELECTRONIC STRUCTURE AND THE OPTICAL PROPERTIES OF SEMICONDUCTING MATERIALS USED IN MODERN SOLID STATE ELECTRONIC CIRCUITRY FOR DETECTION, AMPLIFICATION AND COMMUNICATION IN AEROSPACE ENVIRONMENTS. THIS IS ESSENTIAL TO THE DESIGN OF OPTICAL DETECTORS AND DEVICES. THE STUDY INVOLVED CALCULATIONS OF THE HIGH-FREQUENCY CONDUCTIVITY AND DIELECTRIC PROPERTIES OF SEMICONDUCTORS INCLUDING ANISOTROPIC FEATURES, TAKING INTO ACCOUNT ELECTRONIC AND IONIC CORRELATIONS AND FLUCTUATIONS. EFFECTS OF MAGNETIC FIELDS, IMPURITIES AND BAND STRUCTURE. THE PRINCIPAL TECHNIQUE USED WAS THE MANY-BODY PERTURBATION METHOD, EXTENDED TO INCLUDE VALENCE STATES, STRONG ELECTRON-PHONON AND RADIATION INTERACTIONS AND THE EFFECT OF LOCAL IMPURITY POTENTIALS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-723 834 17/2 20/5
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF PALO ALTO RESEARCH LAB

WIDEBAND LASER COMMUNICATIONS: AN ANNOTATED BIBLIOGRAPHY, (U)

APR 71 137P TEMPLETON, JOE H. ;
REPT. NO. LMSC-N-JY-71-3, LMSC-SB-71-1
CONTRACT: N00014-71-C-0049, ARPA ORDER-306

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, BIBLIOGRAPHIES), (*LASERS, LIGHT COMMUNICATION SYSTEMS), BROADBAND, OPTICAL PHENOMENA, INFORMATION THEORY, GAS LASERS, TRACKING, ELECTROOPTICS, DIGITAL SYSTEMS, SIGNAL-TO-NOISE RATIO, ABSTRACTS (U)
IDENTIFIERS: LASER COMMUNICATION SYSTEMS (U)

261 HIGHLY SPECIFIC ABSTRACT/CITATIONS ON THE SUBJECT OF WIDEBAND LASER COMMUNICATIONS MAKE UP THIS BIBLIOGRAPHY. JOURNAL ARTICLES, BOOKS, AND GOVERNMENT REPORTS HAVE BEEN CHOSEN FOR INCLUSION FROM ABSTRACTS APPEARING IN THE NASA STAR, TAB, U.S.G.R.D.R., AND IAA. COVERAGE WAS FOR THE YEARS 1964-1970. CITATIONS ARE ARRANGED ALPHABETICALLY BY AUTHOR. AMONG THE SUBJECTS COVERED ARE: OPTICAL COMMUNICATION AT HIGH DATA RATES, OPTICAL BEAM ACQUISITION AND FINE TRACKING, AND ATMOSPHERIC EFFECTS ON LASER BEAM PROPAGATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-723 902 20/5 17/2
CALIFORNIA INST OF TECH PASADENA

SEMI-ANNUAL TECHNICAL REPORT ON PROGRESS
FOR THE PERIOD JULY 1970 - DECEMBER 1970, (U)

70 19P LAUSSADE,JEAN-PIERRE ;YARIV,
AMON ;CASPERSON,LEE ;
CONTRACT: DAHC04-68-C-0041, ARPA ORDER-675

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN VARIOUS JNLS.

DESCRIPTORS: (*COHERENT RADIATION, LIGHT
TRANSMISSION), (*GAS LASERS, GAIN), LIGHT
COMMUNICATION SYSTEMS, TURBULENCE, REFRACTIVE INDEX,
CORRELATION TECHNIQUES, DISTRIBUTION FUNCTIONS,
ATMOSPHERE (U)
IDENTIFIERS: XENON LASERS, WAVE EQUATIONS,
HELIUM XENON LASERS (U)

;CONTENTS: A THEORETICAL STUDY OF OPTICAL WAVE
PROPAGATION THROUGH RANDOM ATMOSPHERIC TURBULENCE;
LONGITUDINAL MODES IN A HIGH-GAIN LASER. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-723 972 20/6
ILLINOIS UNIV URBANA DEPT OF ELECTRICAL ENGINEERING

SPATIAL MODULATION OF LIGHT USING SURFACE WAVES IN AN INTERFEROMETER. (U)

FEB 70 4P HUNSINGER,BILL J. ; HOLSHOUSER,D. ;
CONTRACT: AF-AFOSR-390-67
PROJ: AF-9767
TASK: 976702
MONITOR: AFOSR TR-71-1461

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN APPLIED PHYSICS LETTERS, V16 N7 P272-273, 1 APR 70.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH MAGNAVOX CO., URBANA, ILL. REVISION OF REPORT DATED 12 DEC 69.

DESCRIPTORS: (*LIGHT TRANSMISSION, PHASE MODULATION), (*DIFFRACTION GRATINGS, LIGHT TRANSMISSION), INTERFEROMETERS, LASERS, FOURIER ANALYSIS, PIEZOELECTRIC CRYSTALS (U)
IDENTIFIERS: SWIM(SURFACE WAVE INTERFERENCE MODULATORS), SURFACE WAVE INTERFERENCE MODULATORS, SIGNAL PROCESSING, LITHIUM NIOBATES, SURFACE WAVES, ACOUSTIC SURFACE WAVES, ACOUSTOOPTIC INTERACTIONS (U)

AN OPTICAL PHASE GRATING HAS BEEN GENERATED BY INTRODUCING SURFACE WAVES ON ONE FACE OF A FABRY-PEROT INTERFEROMETER. THIS DEVICE CALLED SWIM (SURFACE WAVE INTERFERENCE MODULATOR) PRODUCES A DIFFRACTION PATTERN AT THE FOURIER PLANE IN WHICH THE LIGHT INTENSITY OF THE FIRST-ORDER MODULATED BEAM IS 1% OF THE ZEROTH ORDER WITH AN ACOUSTIC POWER OF 0.85MW/MM BEAM WIDTH. FIRST-ORDER INTENSITIES GREATER THAN 10% HAVE BEEN REALIZED; HOWEVER, THE PROCESS IS NOT LINEAR AT THIS MODULATION DEPTH. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-724 028 20/6
ROYAL AIRCRAFT ESTABLISHMENT FARNBOROUGH (ENGLAND)

A BIBLIOGRAPHY ON OPTICAL MODULATORS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 71 32P ELLIS,B. ;WALTON,A. K. ;
REPT. NO. RAE-TR-71009
MONITOR: TRC BR-23770

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH SHEFFIELD UNIV., YORKSHIRE (ENGLAND), DEPT. OF PHYSICS.

DESCRIPTORS: (*LIGHT TRANSMISSION, MODULATION), (*MODULATORS, *BIBLIOGRAPHIES), ELECTROOPTICS, LASERS, IRASERS, OPTICAL MATERIALS, OPTICAL INSTRUMENTS, GREAT BRITAIN, MAGNETO-OPTIC EFFECT (U)
IDENTIFIERS: *OPTICAL MODULATORS, ACOUSTOOPTIC MODULATORS (U)

APPROXIMATELY 250 REFERENCES, MANY OF WHICH CARRY BRIEF ANNOTATION, ARE PROVIDED, COVERING THE FIELD OF OPTICAL MODULATION OVER THE SPAN 1950-1970. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-724 414 9/4 17/2
ROCHESTER UNIV N Y DEPT OF PHYSICS AND ASTRONOMY

INFORMATION RATE IN AN OPTICAL COMMUNICATION CHANNEL, (U)

AUG 70 10P JODOIN,R. ;MANDEL,L. ;

CONTRACT: F44620-69-C-0086
PROJ: AF-9767
TASK: 976702
MONITOR: AFOSR TR-71-1573

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF THE OPTICAL SOCIETY OF AMERICA, V61 N2 P191-198 FEB 71.

DESCRIPTORS: (*INFORMATION THEORY, STATISTICAL ANALYSIS), (*LIGHT COMMUNICATION SYSTEMS, INFORMATION THEORY), INTEGRALS, PROBABILITY DENSITY FUNCTIONS, LASERS, LIGHT TRANSMISSION, CODING (U)

AN OPTICAL COMMUNICATION CHANNEL IS ANALYZED, IN WHICH A LIGHT BEAM IS AMPLITUDE MODULATED AT THE SOURCE BY A FILTER OF CONTINUOUSLY VARIABLE TRANSMITTANCE, AND THE DETECTOR COUNTS THE RECEIVED PHOTONS. SUCH A COMMUNICATION CHANNEL HAS INTRINSIC NOISE LIMITATIONS BECAUSE THERE IS NOT A ONE-TO-ONE CORRESPONDENCE BETWEEN THE MODULATED BEAM POWER AND THE NUMBER OF COUNTS REGISTERED. THE INFORMATION RATES ACHIEVABLE WITH SINGLE-MODE AND MULTIMODE LASERS ARE EVALUATED AS FUNCTIONS OF THE MEAN NUMBER N OF DETECTED PHOTONS PER SYMBOL, FOR SEVERAL DIFFERENT INPUT STATISTICS. FOR LARGE N THE INFORMATION RATE INCREASES LOGARITHMICALLY WITH N. IT IS SHOWN THAT, WHEN THE SYMBOL LENGTH IS SHORT, THERE IS A MINIMUM NUMBER OF INDEPENDENT MODES FOR WHICH THE MULTIMODE LASER GIVES A GREATER INFORMATION RATE THAN THE SINGLE-MODE LASER, IF THE LASER POWER IS EQUALLY DIVIDED AMONG ALL THE MODES, AND THE POWER PER MODE IS REGARDED AS CONSTANT. HOWEVER, FOR EVEN MODERATE NUMBERS OF DETECTED PHOTONS PER SYMBOL, THIS MINIMUM NUMBER OF MODES IS SO GREAT THAT THE SINGLE-MODE LASER IS TO BE PREFERRED. WHEN THE LIGHT BEAM IS DERIVED FROM A THERMAL SOURCE, THE INFORMATION RATE IN THE CHANNEL IS, IN EFFECT, GOVERNED BY THE SAME EQUATIONS AS THOSE FOR THE SINGLE-MODE LASER, SO LONG AS THE DETECTOR AREA IS LIMITED TO A COHERENCE AREA. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-725 067 20/5
CASE WESTERN RESERVE UNIV CLEVELAND OHIO DIV OF ELECTRICAL SCIENCES AND APPLIED PHYSICS

STARK EFFECT MODULATION STUDIES. (U)

DESCRIPTIVE NOTE: FINAL REPT. 18 MAR 68-31 DEC 70,
MAR 71 73P PAO,YOH-HAN ;CLASPY,PAUL C. ;JOHNSON,W. B. ;
CONTRACT: F19628-68-C-0183
PROJ: AF-4645
TASK: 464507
MONITOR: AFCRL 71-0179

UNCLASSIFIED REPORT

DESCRIPTORS: (*COHERENT RADIATION, FREQUENCY MODULATION), (*GAS LASERS, STARK EFFECT), GAIN, HARMONIC ANALYSIS, ABSORPTION SPECTRUM, IRASERS (U)
IDENTIFIERS: INTERMEDIATE INFRARED RADIATION, Q SWITCHING, *CARBON DIOXIDE LASERS (U)

IT HAS BEEN DETERMINED THAT IT IS PRACTICAL TO USE THE MOLECULAR STARK EFFECT IN GASES TO MODULATE LASER RADIATION IN THE 10 MICRON REGION. A LARGE NUMBER OF SUITABLE MODULATOR GAS CONSTITUENTS HAVE BEEN STUDIED AND PARAMETERS GOVERNING GAS CELL MODULATOR DESIGN HAVE ALSO BEEN IDENTIFIED. SUCH MODULATORS MAY BE USED BOTH WITHIN AND EXTERNAL TO THE LASER CAVITY. IN INTRA CAVITY CONFIGURATIONS, LARGE MODULATION DEPTHS ARE EASILY OBTAINED WITH LOW MODULATOR POWER. RESULTS OF THEORETICAL STUDIES INDICATE THAT WITHIN THE FREQUENCY RANGES OF PRACTICAL INTEREST, THERE IS NO INTRINSIC LIMIT TO THE FREQUENCY RESPONSE. HOWEVER WHEN MODULATING FREQUENCY IS LARGER THAN THE VALUE OF THE HOMOGENEOUS LINEWIDTH, THERE IS A DECREASE IN EFFECTIVENESS. EXPERIMENTAL RESULTS SHOWING NON-DISPERSIVE MODULATION AT FREQUENCIES TO 30 MEGAHERTZ HAVE BEEN OBTAINED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-725 103 17/8 20/6
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ELECTRICAL ENGINEERING

APPROXIMATE PHOTOCOUNT STATISTICS FOR COHERENT AND CHAOTIC RADIATION OF ARBITRARY SPECTRAL SHAPE, (U)

AUG 70 11P LACHS,GERARD ;
CONTRACT: DA-31-124-ARO(D)-383
PROJ: DA-2-0-061102-B-31-E
MONITOR: AROD 5659:12-E

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS, V42 N2 P602-609 FEB 71.
SUPPLEMENTARY NOTE: SPONSORED IN PART BY THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.

DESCRIPTORS: (*LIGHT, DETECTION), (*COHERENT RADIATION, DETECTION), (*PHOTONS, COUNTING METHODS), LIGHT COMMUNICATION SYSTEMS, LASERS, STATISTICAL ANALYSIS (U)

A METHOD FOR COMPUTING THE APPROXIMATE PHOTOCOUNT STATISTICS FOR GAUSSIAN LIGHT IS PRESENTED. THIS METHOD MAY BE USED FOR THE SUPERPOSITION OF COHERENT RADIATION WITH CHAOTIC RADIATION OF ARBITRARY SPECTRAL SHAPE. DATA IS PRESENTED FOR GAUSSIAN-, TRIANGULAR-, AND SQUARE-SHAPED SPECTRA AS WELL AS FOR LORENTZIAN-SHAPED SPECTRA. THE RESULTS SHOW THAT THE PHOTOCOUNT STATISTICS ARE SIGNIFICANTLY DEPENDENT UPON SPECTRAL SHAPE FOR INTERMEDIATE TIME-BANDWIDTH PRODUCTS. THE RESULTS ALSO SHOW THAT THE BEDARD, CHANG, AND MANDEL APPROXIMATION GIVES A BETTER FIT TO A GAUSSIAN-SHAPED SPECTRUM THAN TO A LORENTZIAN-SHAPED SPECTRUM. SIGNIFICANT DIFFERENCES BETWEEN THE PHOTOCOUNT STATISTICS FOR A TIME-BANDWIDTH PRODUCT OF 10 AND POISSON STATISTICS WERE ALSO OBTAINED; EVEN FOR A SIGNAL-TO-NOISE RATIO OF 40:1. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-726 139 20/5
INFORMATICS TISCO INC RIVERDALE MD

BIBLIOGRAPHY OF SOVIET LASER DEVELOPMENTS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. NO. 3, JAN-MAR 71, APR 71 57P ALLEN,LIDA L. ;HIBBEN, STUART G. ;
CONTRACT: F44620-70-C-0081, ARPA ORDER-1622
PROJ: AF-6270ID
MONITOR: AFOSR TR-71-1777

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, USSR), (*BIBLIOGRAPHIES, LASERS), DYES, GAS LASERS, IRASERS, OPTICAL EQUIPMENT COMPONENTS, SCIENTIFIC RESEARCH, COHERENT RADIATION (U)
IDENTIFIERS: QUANTUM ELECTRONICS, SOLID STATE LASERS, SEMICONDUCTOR LASERS, GALLIUM ARSENIDE LASERS, RUBY LASERS, GLASS LASERS, INJECTION LASERS, LIQUID LASERS, CHEMICAL LASERS, ULTRAVIOLET LASERS, HOLOGRAPHY, LASER MATERIALS (U)

OF ALL MATERIAL REVIEWED, THE MAJOR YIELD HAS BEEN FROM THE APPROXIMATELY 300 PERIODICALS WHICH ARE KNOWN TO REPORT THE MOST ADVANCED AND INTERESTING FINDINGS IN SOVIET LASER TECHNOLOGY. THE PERIOD COVERED IS THE FIRST QUARTER OF 1971, AND INCLUDES ALL LASER-RELATED ARTICLES RECEIVED BY US IN THAT INTERVAL. THE STRUCTURE AND SELECTION CRITERIA ARE THE SAME AS USED IN THE FIRST REPORT. SOMEWHAT BROADENED SELECTION CRITERIA HAVE BEEN USED FOR ITEMS PERTINENT TO CHEMICAL LASERS, IN VIEW OF THE EXPANDING POSSIBILITIES IN THIS TECHNOLOGY. OUR LITERATURE SEARCH ALSO REVEALS AN INCREASED EMPHASIS ON HOLOGRAPHIC STUDIES, AS WELL AS OF USES OF STIMULATED RAMAN SCATTERING EFFECTS IN SPECTROSCOPY. OTHER ITEMS WORTHY OF MENTION ARE TWO ARTICLES ON ULTRAVIOLET LASERS AND ONE ON USE OF AN ARGON ION LASER FOR UNDER WATER TV TRANSMISSION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-727 583 20/6 20/5 17/5
RAND CORP SANTA MONICA CALIF

ON THE PHASE STRUCTURE AND MUTUAL COHERENCE FUNCTION OF AN OPTICAL WAVE IN A TURBULENT ATMOSPHERE, (U)

JUN 71 26P LUTOMIRSKI,R. F. ;YURA,H. T. ;

REPT. NO. RM-6266-1-ARPA
CONTRACT: DAHC15-67-C-0141, ARPA ORDER-189-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*COHERENT RADIATION, *LIGHT TRANSMISSION), ATMOSPHERE, TURBULENCE, POWER SPECTRA, INFRARED DETECTORS, SIGNAL-TO-NOISE RATIO, LASERS (U)
IDENTIFIERS: WAVE EQUATIONS (U)

THE PRESENT WORK SHOWS THAT THE MOST COMMONLY USED EXPRESSION FOR THE MUTUAL COHERENCE FUNCTION (MCF) FOR AN OPTICAL WAVE PROPAGATING IN A TURBULENT ATMOSPHERE IS, IN GENERAL, INCORRECT. THIS EXPRESSION IS BASED ON AN UNPHYSICAL EXTRAPOLATION OF THE KOLMOGOROV SPECTRUM. ALONG AN ATMOSPHERIC PATH, WITH SPECIFIED TURBULENCE PARAMETERS, THE NEW MCF IS SHOWN TO IMPLY GREATER RESOLUTION, LESS BEAM SPREADING, AND GREATER HETERODYNE SIGNAL-TO-NOISE RATIOS THAN INDICATED BY PREVIOUS CALCULATIONS. BY COMPARING THESE RESULTS WITH THOSE PREVIOUSLY OBTAINED FOR HETERODYNE DETECTION, THE PERCENTAGE ERRORS IN THE PREVIOUS CALCULATIONS ARE SHOWN TO INCREASE WITH DECREASING PROPAGATION PATHS. IN PARTICULAR, WHERE IT WAS FORMERLY THOUGHT THAT THE ATMOSPHERE LIMITED THE EFFECTIVE COHERENT DETECTION SIZE IN HETERODYNE DETECTION AT ALL RANGES, THE PRESENT CALCULATION REVEALS THAT OVER SUFFICIENTLY SHORT PATHS, THERE IS NO SIZE LIMIT IMPOSED BY THE ATMOSPHERE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-728 101 20/5
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

A STUDY OF LASER RESONATORS AND MODE-LOCKING. (U)

DESCRIPTIVE NOTE: RESEARCH AND DEVELOPMENT TECHNICAL REPT.,
MAY 71 48P WOLFE,MARTIN I. ;
REPT. NO. ECOM-3422
PROJ: DA-1-H-662701-A-448
TASK: 1-H-662701-A-44804

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, OPTICAL PROPERTIES), LIGHT COMMUNICATION SYSTEMS, WAVE FUNCTIONS, FREQUENCY SHIFT, REFRACTION, DOPPLER EFFECT (U)
IDENTIFIERS: MODE LOCKED LASERS, LASER MATERIALS (U)

THE FIRST PART OF THE REPORT REPRESENTS A THEORETICAL STUDY OF CONFOCAL RESONATORS. THE SECOND PART CONSISTS OF A STUDY OF MODE-LOCKING AND TECHNIQUES THAT USE MODE-LOCKED LASERS. THE REPORT IS INTENDED TO PRESENT A DETAILED ANALYSIS OF A CONFOCAL RESONATOR IN ORDER TO ILLUSTRATE THE APPLICABILITY OF THE METHOD OF ANALYSIS FOR FURTHER INVESTIGATION OF RESONATORS FOR MODE-LOCKED LASERS. ALSO THE POTENTIAL OF MODE-LOCKED LASERS FOR USE IN A HIGH-BIT RATE COMMUNICATIONS SYSTEM IS INVESTIGATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-728 743 20/6
RAND CORP SANTA MONICA CALIF

PROPAGATION OF A FOCUSED LASER BEAM IN A TURBULENT ATMOSPHERE, (U)

JUN 71 33P LUTOMIRSKI,R. F. ;
REPT. NO. R-608-ARPA
CONTRACT: DAHC15-67-C-0141, ARPA ORDER-189-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-707 861.

DESCRIPTORS: (*COHERENT RADIATION, FOCUSING), (*LIGHT TRANSMISSION, ATMOSPHERIC MOTION), LIGHT COMMUNICATION SYSTEMS, RANGE FINDING, TARGET ACQUISITION, REFRACTIVE INDEX, GAS LASERS, IRASERS (U)
IDENTIFIERS: CARBON DIODIDE LASERS, LASER BEAMS (U)

A METHOD IS GIVEN FOR CALCULATING THE PERFORMANCE OF A LASER SYSTEM WITH BEAM TRUNCATED BY FOCUSING OPTICS IN A TURBULENT ATMOSPHERE. PREVIOUS ANALYSES HAVE BEEN LIMITED TO VACUUM CALCULATIONS WITH UNTRUNCATED BEAMS, AND EVEN THEN HAVE NOT CONSERVED THE IRRADIANCE. THIS APPROACH SEPARATES THE GEOMETRY OF THE PROBLEM (THE COMPLEX APERTURE DISTRIBUTION) FROM THE BEAM PROPAGATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-729 263 20/5
NORTHROP CORPORATE LABS HAWTHORNE CALIF

CO2 LASER PULSING TECHNIQUES. (U)

DESCRIPTIVE NOTE: SEMIANNUAL REPT. DEC 69-DEC 71,
AUG 71 35P MANN,M. M. ;
REPT. NO. NCL-71-41R
CONTRACT: N00014-70-C-0185, ARPA ORDER-306

UNCLASSIFIED REPORT

DESCRIPTORS: (*GAS LASERS, LIGHT PULSES),
(*COHERENT RADIATION, MODULATION),
ELECTROOPTICS, AMPLITUDE MODULATION, FREQUENCY
MODULATION, GALLIUM ARSENIDES, LIGHT COMMUNICATION
SYSTEMS, RANGE FINDING (U)
IDENTIFIERS: *CARBON DIOXIDE LASERS, MODE LOCKED
LASERS (U)

IN A STUDY OF CO2 LASER PULSING TECHNIQUES,
MODE-LOCKING AND PULSE COUPLING OF A CO2 LASER
USING A SINGLE ELECTROOPTIC ELEMENT HAVE BEEN
DEMONSTRATED. DATA ON THE EFFECT OF MODULATOR
DETUNING AND COUPLING FACTOR VARIATION ARE PRESENTED.
THE PRELIMINARY RESULTS OF AN INVESTIGATION OF
ELECTROOPTIC TECHNIQUES FOR AM AND FM LOCKING OF
TEA LASERS ARE GIVEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-729 334 20/5
ARMY MISSILE COMMAND REDSTONE ARSENAL ALA PHYSICAL SCIENCES DIRECTORATE

CO2 LASER PULSING, (U)

JUL 71 112P PARDUE, ALBERT L. , JR;
REPT. NO. RR-TR-71-8
PROJ: DA-1-T-262303-A-308

UNCLASSIFIED REPORT

DESCRIPTORS: (*GAS LASERS, LIGHT PULSES), PULSE MODULATION, COHERENT RADIATION, WAVE FUNCTIONS, IRASERS (U)
IDENTIFIERS: *CARBON DIOXIDE LASERS, Q SWITCHED LASERS, MODE LOCKED LASERS, LASER BEAMS, WAVE EQUATIONS (U)

A THEORETICAL AND EXPERIMENTAL ANALYSIS OF LASER MODE COUPLING AND REACTIVE Q-SWITCHING HAS BEEN PRESENTED. IN THE FORCED MODE LOCKING SITUATION, THE TOTAL CAVITY ELECTROMAGNETIC FIELD INTENSITY E(Z,T) WAS EXPRESSED AS AN EXPANSION OF QUASI-NORMAL MODES WHICH SATISFY THE BOUNDARY CONDITIONS AT BOTH THE FIXED AND MOVING MIRROR. SOLUTIONS OF THE WAVE EQUATION INDICATED THAT THE MODES OF OPERATION WERE ANALOGOUS TO THE PHASED LOCKED OSCILLATIONS OF THE PHASE-MODULATED LASER. A PEAK MIRROR EXCURSION OF 1400 ANGSTROMS WAS USED TO MODE LOCK A CO2 LASER. REACTIVE Q-SWITCHING WAS OBTAINED BY MODULATION OF THE CAVITY LENGTH WITH A MOSSBAUER TRANSDUCER. REGULAR Q-SWITCHED PULSES WERE OBTAINED AT RATES BETWEEN 1 AND 60 KILOHERTZ. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-729 447 20/6 20/5 4/1
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS

ATMOSPHERIC ATTENUATION OF CO LASER RADIATION. (U)

DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS, JUL 71 118P MCCLATCHEY,R. A. ;
REPT. NO. AFCRL-71-0370, AFCRL-ERP-359

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT TRANSMISSION, ATMOSPHERE), (*COHERENT RADIATION, ATTENUATION), ABSORPTION SPECTRUM, INFRARED RADIATION, GAS LASERS, IRASERS, TABLES (U)
IDENTIFIERS: CARBON MONOXIDE LASERS, ATMOSPHERIC ATTENUATION (U)

WITH THE DEVELOPMENT OF THE CO LASER HAVING EMISSION LINES IN THE RANGE FROM 1200/CM TO GREATER THAN 2000/CM, IT IS OF IMPORTANCE TO ESTABLISH WHICH OF THE MORE THAN 200 LINES CAN BE TRANSMITTED THROUGH A VARIETY OF ATMOSPHERIC PATHS. THE SPECTRAL REGION OF CO EMISSION SPANS A VERY IMPORTANT WATER VAPOR ABSORPTION BAND AND, IN ADDITION, THERE IS ABSORPTION BY CO2, O3, N2O AND CH4. ABSORPTION LINES ASSOCIATED WITH ALL OF THESE MOLECULES WERE INCLUDED IN THE CALCULATION OF SYNTHETIC SPECTRA COVERING THE REGION OF CO EMISSION. AFTER LIMITING THE NUMBER OF CO EMISSION LINES TO BE CONSIDERED IN DETAIL ACCORDING TO A CRITERION BASED ON ATMOSPHERIC ATTENUATION, A SERIES OF TABLES WAS CONSTRUCTED PROVIDING QUANTITATIVE ATTENUATION INFORMATION FOR EACH OF 88 LASER LINES AND FOR 10 DIFFERENT ATMOSPHERIC MODELS. DATA BASED ON TWO DIFFERENT AEROSOL SCATTERING MODELS ARE INCLUDED IN THESE TABLES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-729 888 20/5
INFORMATICS TISCO INC RIVERDALE MD

BIBLIOGRAPHY OF SOVIET LASER DEVELOPMENTS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. JAN 69-JUN 70, JAN 71 202P ALLEN,LIDA L. ;
CONTRACT: F44620-70-C-0081, ARPA ORDER-1622
MONITOR: AFOSR TR-71-0947

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO INTERIM REPT. NO. 3, AD-726 139.

DESCRIPTORS: (*LASERS, USSR), (*BIBLIOGRAPHIES, LASERS), SCIENTIFIC RESEARCH, GAS LASERS, IRASERS, SEMICONDUCTORS, DYES, COHERENT RADIATION, OPTICAL EQUIPMENT COMPONENTS, LIGHT COMMUNICATION SYSTEMS, STEREOSCOPIC PHOTOGRAPHY, PLASMA GENERATORS (U)
IDENTIFIERS: QUANTUM ELECTRONICS, SOLID STATE LASERS, SEMICONDUCTOR LASERS, INJECTION LASERS, LIQUID LASERS, CHEMICAL LASERS, ULTRAVIOLET LASERS, HOLOGRAPHY, LASER MATERIALS, NONLINEAR OPTICS, SECOND HARMONIC GENERATION (U)

THE BIBLIOGRAPHY OF SOVIET PUBLICATIONS ON LASERS COVERS THE PERIOD 1969-1970. APPROXIMATELY 1500 ARTICLES ARE CITED. THIS OUTPUT IS CLEAR EVIDENCE OF INCREASED ATTENTION TO ADVANCED DEVELOPMENT IN SUCH AREAS AS HOLOGRAPHY, BEAM-TARGET INTERACTIONS, HIGH-TEMPERATURE PLASMA GENERATION AND CHEMICAL LASERS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-730 438 20/12 20/6
NAVAL RESEARCH LAB WASHINGTON D C

OPTICAL WAVEGUIDES AND INTEGRATED OPTICS TECHNOLOGY. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
AUG 71 34P ANDREWS,R. A. ;
REPT. NO. NRL-7291
PROJ: RR002-07-41-5064, NRL-N01-12

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTING FILMS, *ELECTROOPTICS), (*WAVEGUIDES, ELECTROOPTICS), LASERS, DIELECTRICS, FIBER OPTICS, MODULATORS, GALLIUM ARSENIDES, OPTICAL EQUIPMENT COMPONENTS, DETECTORS, LIGHT COMMUNICATION SYSTEMS, COMPUTERS, LOGIC CIRCUITS, DISPLAY SYSTEMS (U)
IDENTIFIERS: NONLINEAR OPTICS, QUANTUM ELECTRONICS, *OPTICAL WAVEGUIDES, SEMICONDUCTOR LASERS, THIN FILMS (U)

AN INTRODUCTION IS GIVEN TO THE OPTICAL WAVEGUIDE AND INTEGRATED OPTICS TECHNOLOGY WITH EMPHASIS ON POTENTIAL APPLICATION IN NAVY SYSTEMS. THE FUNDAMENTALS OF OPTICAL WAVEGUIDES ARE PRESENTED, AS WELL AS A DISCUSSION OF THEIR IMPORTANT CHARACTERISTICS. A DESCRIPTION OF ALL THE WAVEGUIDE PASSIVE AND ACTIVE DEVICES THAT HAVE BEEN DEMONSTRATED IS GIVEN. AREAS WHERE NEW DEVICES ARE POSSIBLE ARE ALSO DISCUSSED. THIS DISCUSSION INCLUDES OPTICAL WAVEGUIDES, PASSIVE OPTICAL ELEMENTS, COUPLERS, LASERS AND AMPLIFIERS, MODULATORS, DEFLECTORS, DETECTORS, NONLINEAR DEVICES, AND INPUT AND OUTPUT COUPLERS. THE APPLICATION OF THESE DEVICES TO INTEGRATED OPTICAL SYSTEMS FOR COMMUNICATIONS, DISPLAY, AND COMPUTERS IS DISCUSSED. CONCLUSIONS ARE DRAWN ABOUT THE FUTURE GROWTH OF THIS TECHNOLOGY IN LIGHT OF THE CURRENT POTENTIAL AND THE IMPORTANT PROBLEM AREAS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-731 109 20/2 20/5
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS

PREPARATION AND PROPERTIES OF CUPROUS IODIDE, (U)

JUN 71 7P O'CONNOR, JOHN J. ;
ARMINGTON, ALTON F. ;
REPT. NO. AFCRL-71-0478
PROJ: AF-5620
TASK: 562009

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN MATERIALS RESEARCH BULLETIN, V6 P765-770 1971.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 9 JUN 71.

DESCRIPTORS: (*IODIDES, *CRYSTAL GROWTH), COPPER COMPOUNDS, HYDROLYSIS, MODULATORS, LASERS, X-RAY DIFFRACTION ANALYSIS (U)
IDENTIFIERS: *COPPER IODIDES, *LASER MODULATORS, LASER MATERIALS (U)

CUPROUS IODIDE, A POTENTIAL LASER MODULATOR MATERIAL, HAS BEEN GROWN FROM HYDRIODIC ACID SOLUTON BY THE SLOW DECOMPOSITION OF THE CUI:HI COMPLEX. EMISSION SPECTROGRAPHIC ANALYSIS DEMONSTRATED THAT THE CRYSTALS PRODUCED ARE CONSIDERABLY PURER THAN THE STARTING MATERIAL. A LAUE PATTERN INDICATES A HIGH DEGREE OF CRYSTAL PERFECTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-731 242 20/5
INFORMATICS TISCO INC RIVERDALE MD

BIBLIOGRAPHY OF SOVIET LASER DEVELOPMENTS. (U)

DESCRIPTIVE NOTE: REPT. NO. 2, JUL-DEC 70,
JUL 71 146P HIBBEN,STUART G. ;
CONTRACT: F44620-70-C-0081, ARPA ORDER-1622
MONITOR: AFOSR TR-71-2653

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED 14 JAN 71, AD-729 888.

DESCRIPTORS: (*LASERS, USSR), (*BIBLIOGRAPHIES, LASERS), SCIENTIFIC RESEARCH, GAS LASERS, IRASERS, SEMICONDUCTORS, DYES, COHERENT RADIATION, OPTICAL EQUIPMENT COMPONENTS, RADIATION DAMAGE, RADIATION EFFECTS, LIGHT COMMUNICATION SYSTEMS, STEREOSCOPIC PHOTOGRAPHY, PLASMA GENERATORS, STANDARDS (U)
IDENTIFIERS: QUANTUM ELECTRONICS, SOLID STATE LASERS, SEMICONDUCTOR LASERS, LIQUID LASERS, CHEMICAL LASERS, ULTRAVIOLET LASERS, LASER MATERIALS, NONLINEAR OPTICS, HOLOGRAPHY (U)

THIS IS THE SECOND ISSUE INTENDED TO GIVE A COMPREHENSIVE LISTING OF SOVIET PUBLICATIONS IN LASER TECHNOLOGY FOR 1969-1970, AND COMPLEMENTS THE FIRST ISSUE BY COVERING ALL THE NON-PERIODIC LITERATURE FOR THIS INTERVAL. THIS INCLUDES OVER 100 SOURCES COMPRISING INSTITUTIONAL TRANSACTIONS, COLLECTIONS OF ARTICLES, CONFERENCE PROCEEDINGS, AND MONOGRAPHS DEALING WITH LASER DEVELOPMENTS. ALSO INCLUDED IS MATERIAL FROM REGULAR PERIODICALS FOR JULY THROUGH DECEMBER, 1970. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-731 535 17/2
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

TOPICS IN MILLIMETER-WAVE AND OPTICAL SPACE COMMUNICATION. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,
SEP 71 38P WARD,WILLIAM W. ;ZOLNAY, STEPHEN L. ;
REPT. NO. TN-1971-43
CONTRACT: F19628-70-C-0230
PROJ: AF-649L
MONITOR: ESD TR-71-269

UNCLASSIFIED REPORT

DESCRIPTORS: (*SPACE COMMUNICATION SYSTEMS, MILLIMETER WAVES), (*LIGHT COMMUNICATION SYSTEMS, SPACE COMMUNICATION SYSTEMS), LASERS, ATTENUATION, PERFORMANCE(ENGINEERING), RELIABILITY (U)
IDENTIFIERS: FREQUENCY ALLOCATION, YAG LASERS, NEODYMIUM LASERS, CARBON DIOXIDE LASERS (U)

MANY COMPARATIVE STUDIES HAVE BEEN MADE OF MILLIMETER-WAVE AND OPTICAL SPACE-COMMUNICATION SYSTEMS. THE APPLICATIONS CONSIDERED HAVE BEEN DIVERSE, INCLUDING LINKS BETWEEN SATELLITES IN LOW EARTH ORBITS, SATELLITES IN SYNCHRONOUS ORBITS, DEEP-SPACE PROBES, AND EARTH TERMINALS, WITH DATA-RATE REQUIREMENTS FROM A FEW BIT/SEC TO GBIT/SEC. THIS REPORT PRESENTS A SHORT TUTORIAL ACCOUNT OF THE COMMON AND OF THE DISTINCTLY DIFFERENT FEATURES OF SOME MILLIMETER-WAVE AND OPTICAL SPACE-COMMUNICATION SYSTEMS. FOR EXAMPLE, THE DESIGN OF THE TRANSMITTING ANTENNAS IS GOVERNED BY THE SAME ELECTROMAGNETIC THEORY, WHICH ACCOUNTS FOR DIFFRACTION AT AN APERTURE. HOWEVER, THE SIGNAL-TO-NOISE RELATIONSHIPS IN THE RECEIVERS MAY NOT BE THE SAME (GAUSSIAN VS POISSON NOISE STATISTICS). POSSIBLE SATELLITE APPLICATIONS ARE SURVEYED BRIEFLY, WITH MENTION OF THE FAVORABLE AND THE UNFAVORABLE FACTORS ASSOCIATED WITH MILLIMETER-WAVE AND OPTICAL SPACE-COMMUNICATION SYSTEMS. CANDIDATE SYSTEMS ARE POSTULATED AND LINK CALCULATIONS ARE GIVEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-732 109 20/5
STANFORD UNIV CALIF MICROWAVE LAB

MODULATOR FREQUENCY DETUNING EFFECTS IN THE FM MODE-LOCKED LASER, (U)

JUL 70 7P SIEGMAN, A. E. ; KUIZENGA, DIRK J. ;
CONTRACT: F44620-69-C-0017
PROJ: AF-9767
TASK: 976702
MONITOR: AFOSR TR-2830

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN IEEE JNL. OF QUANTUM ELECTRONICS, VQE6 N12 P803-808 DEC 70.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 4 MAY 70.

DESCRIPTORS: (*LASERS, FREQUENCY MODULATION), COHERENT RADIATION, PHASE SHIFT, GAIN, INTEGRAL TRANSFORMS (U)
IDENTIFIERS: MODE LOCKED LASERS, QUANTUM ELECTRONICS, YAG LASERS, NEODYMIUM LASERS (U)

THE MODE-LOCKING BEHAVIOR OF A HOMOGENEOUS LASER WITH AN INTRACAVITY FM MODULATOR CHANGES RAPIDLY AND ASYMMETRICALLY WHEN THE MODULATION FREQUENCY IS DETUNED BY SMALL AMOUNTS FROM ITS OPTIMUM VALUE. A SIMPLE ANALYSIS OF THESE DETUNING EFFECTS IS DEVELOPED. THE ANALYSIS GIVES EXPLICIT EXPRESSIONS FOR ALL ASPECTS OF THE MODE-LOCKING BEHAVIOR AS FUNCTIONS OF DETUNING. A PHYSICAL INTERPRETATION OF THE ANALYSIS ALSO MAKES CLEAR WHICH PHYSICAL MECHANISMS ARE RESPONSIBLE FOR THE DETUNING BAHAVIOR. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-732 146 20/5
POLYTECHNIC INST OF BROOKLYN FARMINGDALE N Y DEPT OF ELECTROPHYSICS

PASSIVE Q-SWITCHING AND MODE LOCKING OF A CO2 LASER WITH CH3BR, PF5, OR SF6 AND SELF-MODE LOCKING USING ELECTRICAL PULSE EXCITATION, (U)

APR 71 3P JUNG,C. K. ;RONN,A. M. ; LATOURRETTE,J. T. ;
CONTRACT: F44620-69-C-0047
PROJ: AF-4751
MONITOR: AFOSR TR-71-2839

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS, V41 N10 P4240-4242 SEP 70.

DESCRIPTORS: (*GAS LASERS, OPERATION), LIGHT PULSES, MODULATION, GAIN, BROMIDES, FLUORIDES, SULFUR COMPOUNDS, PHOSPHORUS COMPOUNDS, METHANE, IRASERS (U)
IDENTIFIERS: *CARBON DIOXIDE LASERS, *MODE LOCKED LASERS, *Q SWITCHED LASERS, METHANE/BROMO, PHOSPHORUS FLUORIDES, SULFUR HEXAFLUORIDE (U)

RESULTS ARE GIVEN OF EXPERIMENTAL STUDIES USING THE GASES CH3BR, PF5, SF6 AND CO2 WITH ADDED BUFFER GASES HE AND H2 AS SATURABLE ABSORBERS IN Q-SWITCHING AND MODE LOCKING OF A CO2 LASER, INCLUDING SELF MODE LOCKING OBTAINED BY ELECTRICAL PULSE EXCITING OF HALF OF THE DISCHARGE TUBE. (AUTHOR) (U)

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-732 229 20/5
RAYTHEON CO WALTHAM MASS SPECIAL MICROWAVE DEVICES OPERATION

DEVELOPMENT AND FABRICATION OF A YAG LASER SYSTEM FOR STUDY OF MODE LOCKING AND PULSE CODING LASER OUTPUT. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JAN-1 JUL 71,
JUL 71 19P WARGO,LORAND J. ;
REPT. NO. SM-279
CONTRACT: F19628-71-C-0053
PROJ: ILIR-9-70
TASK: ILIR-9-70-01
MONITOR: AFCRL 71-0471

UNCLASSIFIED REPORT

DESCRIPTORS: (*LASERS, YTTRIUM COMPOUNDS), SYSTEMS ENGINEERING, PULSE CODE MODULATION, LIGHT PULSES, ALUMINATES, GARNET, MODULATORS, PUMPING(OPTICAL) (U)
IDENTIFIERS: *YAG LASERS, NEODYMIUM LASERS, MODE LOCKED LASERS, Q SWITCHED LASERS (U)

A SPECIAL PURPOSE, HIGH REPETITION RATE ND:YAG LASER SYSTEM HAS BEEN DESIGNED, DEVELOPED AND FABRICATED FOR USE IN EXPERIMENTS IN MODE LOCKING AND PULSE CODING. THE SYSTEM CONSISTS OF A LASER TRANSMITTER, POWER SUPPLY AND COOLER. THE TRANSMITTER IS A MECHANICALLY STABILIZED, 1 METER LONG OPTICAL CAVITY WITH A FLASH-PUMPED SINGLE CAVITY OSCILLATOR USING A 1/4 IN. X 2 IN. ND:YAG CRYSTAL, A KD CALLITA PRIME P POCKELS CELL, AND A 150 MHZ MODE-LOCKING MODULATOR CELL. THE SYSTEM WAS SUCCESSFULLY TESTED UP TO A REPETITION RATE OF 50 PPS AND A 100 NANOSECOND Q-SWITCHED OUTPUT OF 130 MILLIJOULES. MODE-LOCKED PULSES WERE MEASURED AT 0.8 NANOSECONDS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-732 244 20/5
INFORMATICS TISCO INC RIVERDALE MD

BIBLIOGRAPHY OF SOVIET LASER DEVELOPMENTS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. NO. 4, APR-JUN 71,
AUG 71 100P HIBBEN,STUART G. ;
CONTRACT: F44620-70-C-0081, ARPA ORDER-1622
PROJ: ARPA-0F10
MONITOR: AFOSR TR-71-2814

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-726 139.

DESCRIPTORS: (*LASERS, USSR), (*BIBLIOGRAPHIES, LASERS), GAS LASERS, IRASERS, SEMICONDUCTORS, OPTICAL MATERIALS, OPTICAL EQUIPMENT COMPONENTS, COHERENT RADIATION, CRYSTAL GROWTH, DATA PROCESSING SYSTEMS, LIGHT COMMUNICATION SYSTEMS, STEREOSCOPIC PHOTOGRAPHY, PLASMA GENERATORS (U)
IDENTIFIERS: SOLID STATE LASERS, SEMICONDUCTOR LASERS, LIQUID LASERS, CHEMICAL LASERS, ULTRAVIOLET LASERS, NONLINEAR OPTICS, ORGANIC DYE LASERS, LASER MATERIALS, QUANTUM ELECTRONICS, SECOND HARMONIC GENERATION, HOLOGRAPHY (U)

THE REPORT COVERS THE SECOND QUARTER OF 1971 WITH THE MAJOR YIELD OF INFORMATION COMING FROM THE APPROXIMATELY 30 PERIODICALS KNOWN TO REPORT THE MOST ADVANCED AND INTERESTING FINDINGS IN SOVIET LASER TECHNOLOGY. THIS AS WELL AS THE PREVIOUS THREE REPORTS COVERS THE FOLLOWING TOPICS: (1) LASER RESEARCH -- SOLID STATE, LIQUID, GAS AND CHEMICAL LASERS; UV; COMPONENTS; NONLINEAR OPTICS; SPECTROSCOPY OF LASER MATERIALS; SHORT PULSE GENERATION; CRYSTAL GROWING; AND GENERAL THEORY; (2) LASER APPLICATIONS -- BIOLOGICAL EFFECTS, COMMUNICATION, COMPUTER TECHNOLOGY, HOLOGRAPHY, INSTRUMENTATION, MATERIALS PROCESSING, AND PLASMA GENERATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-733 252 20/6 20/5
HUGHES AIRCRAFT CO CULVER CITY CALIF ELECTRONIC PROPERTIES INFORMATION CENTER

THE ELECTRO-OPTIC EFFECT AND PROPERTIES OF GALLIUM ARSENIDE FOR MODULATION APPLICATIONS. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
NOV 70 11P MILEK,JOHN T. ;
REPT. NO. EPIC-IR-77

UNCLASSIFIED REPORT

DESCRIPTORS: (*GALLIUM ARSENIDES, ELECTROOPTICS), (*COHERENT RADIATION, MODULATORS), SEMICONDUCTORS, GAS LASERS, IRASERS, MODULATION, INFRARED RADIATION (U)
IDENTIFIERS: LASER MODULATORS, CARBON DIOXIDE LASERS, SECOND HARMONIC GENERATION (U)

THE ADVENT OF THE CO2 LASER HAS GENERATED THE NEED FOR A 10.6-MICRON INFRARED MODULATOR. GALLIUM ARSENIDE APPEARS TO BE A VERY SUITABLE MATERIAL FOR INFRARED MODULATION AND HAS BEEN WIDELY EXPLORED AS EVIDENT BY 66 REFERENCES LISTED IN THE BIBLIOGRAPHY PROVIDED BY THIS INTERIM REPORT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-734 046 9/2 18/3
VISIDYNE INC WOBURN MASS

OPTIR II. (U)

DESCRIPTIVE NOTE: SPECIAL SCIENTIFIC REPT. ON VOLUME 1,
SEP 71 190P MANLEY,OSCAR P. ;SMITH,
HENRY J. P. ;TREVE,YVAIN M. ;CARPENTER,JACK
W. ;DEGGES,THOMAS C. ;
REPT. NO. VI-52-1
CONTRACT: F19628-70-C-0097
PROJ: AF-5710
MONITOR: AFCRL 71-0528(I)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO SPECIAL SCIENTIFIC REPT. ON VOLUME 2, AD-734 047.

DESCRIPTORS: (*COMPUTER PROGRAMS, INSTRUCTION MANUALS), (*NUCLEAR EXPLOSIONS, INFRARED RADIATION), (*EXPLOSION EFFECTS, LIGHT), AIRBURST, NUCLEAR RADIATION, MATHEMATICAL MODELS, OPTICAL EQUIPMENT, RADIATION DAMAGE, ULTRAVIOLET RADIATION, CHEMILUMINESCENCE, OPTICAL TRACKING, LIGHT HOMING, LIGHT COMMUNICATION SYSTEMS (U)
IDENTIFIERS: OPTIR 2 COMPUTER CODE (U)

THE REPORT DOCUMENTS THE SECOND GENERATION VERSION OF THE OPTIR CODE - OPTIR II. THE EFFORT IS AIMED AT ESTABLISHING THE BASIC PHYSICAL PRINCIPLES UNDERLYING THE WIDESPREAD, LONG TERM OPTICAL/INFRARED RADIATION OBSERVED FOLLOWING ATMOSPHERIC NUCLEAR DETONATIONS. THE RESULTS OF SUCH STUDIES ARE CRUCIAL TO THE DESIGN AND EVALUATION OF OPTICAL SURVEILLANCE, DETECTION, DISCRIMINATION, TRACKING AND HOMING SYSTEMS AND FUTURE LASER COMMUNICATION SYSTEMS, ALL OF WHICH MUST BE ABLE TO FUNCTION IN A NUCLEAR ENVIRONMENT. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-734 047 9/2 18/3
VISIDYNE INC WOBURN MASS

OPTIR II. (U)

DESCRIPTIVE NOTE: SPECIAL SCIENTIFIC REPT. ON VOLUME 2,
SEP 71 174P MANLEY,OSCAR P. ;SMITH,
HENRY J. P. ;TREVE,YVAIN M. ;CARPENTER,JACK
W. ;DEGGES,THOMAS C. ;
REPT. NO. VI-52-2
CONTRACT: F19628-70-C-0097
PROJ: AF-5710
MONITOR: AFCRL 71-0528(II)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO SPECIAL SCIENTIFIC REPT. ON VOLUME 3, AD-734 048.

DESCRIPTORS: (*COMPUTER PROGRAMS, INSTRUCTION MANUALS), (*NUCLEAR EXPLOSIONS, INFRARED RADIATION), (*EXPLOSION EFFECTS, LIGHT), AIRBURST, NUCLEAR RADIATION, GAMMA RAYS, X RAYS, RADIATION DAMAGE, ATTENUATION, INTEGRAL EQUATIONS, COMPTON SCATTERING, ULTRAVIOLET RADIATION, PHOTOCHEMISTRY, ELECTRON DENSITY, IONIZATION, THERMAL RADIATION, MATHEMATICAL MODELS (U)
IDENTIFIERS: OPTIR 2 COMPUTER CODE (U)

THE REPORT, VOLUME 2, DESCRIBING THE OPTIR 2 COMPUTER CODE IS AN EXTENSION OF VOLUME 1 PERTAINING TO VARIOUS MODELS OF THE RADIATION EFFECTS OF NUCLEAR EXPLOSIONS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-734 048 9/2 18/3
VISIDYNE INC WOBURN MASS

OPTIR II.

(U)

DESCRIPTIVE NOTE: SPECIAL SCIENTIFIC REPT. ON VOLUME 3,
SEP 71 136P MANLEY,OSCAR P. ;SMITH,
HENRY J. P. ;TREVE,YVAIN M. ;CARPENTER,JACK
W. ;DEGGES,THOMAS C. ;
REPT. NO. VI-52-3
CONTRACT: F19628-70-C-0097
PROJ: AF-5710
MONITOR: AFCRL 71-0528(III)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO SPECIAL SCIENTIFIC REPT. ON VOLUME 2.

DESCRIPTORS: (*COMPUTER PROGRAMS, NUCLEAR EXPLOSIONS), (*NUCLEAR EXPLOSIONS, EXPLOSION EFFECTS), AIRBURST, LOW ALTITUDE, NUCLEAR RADIATION, CHEMILUMINESCENCE, RAYLEIGH SCATTERING, AIRGLOW, DIFFERENTIAL EQUATIONS (U)
IDENTIFIERS: OPTIR 2 COMPUTER CODE, PHOTOCHEMICAL REACTIONS, FORTRAN, RKM COMPUTER CODE (U)

THE REPORT, VOLUME 3 OF THE OPTIR 2 COMPUTER CODE DESCRIBES VARIOUS MODELS EMPLOYED IN THE CODE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-734 417 20/5
NORTHROP CORP HAWTHORNE CALIF LASER SYSTEMS DEPT

CO LASER LINE SELECTION TECHNIQUE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. 1 AUG 70-15 DEC 71,
DEC 71 40P BHAUMIK,MANI L. ;
REPT. NO. NLSD-71-7R
CONTRACT: N00014-71-C-0037, N00014-72-C-0043
PROJ: NR-016-303

UNCLASSIFIED REPORT

DESCRIPTORS: (*GAS LASERS, LINE SPECTRUM),
POWER, ABSORPTION SPECTRUM, MOLECULAR
SPECTROSCOPY, IRASERS, LIGHT TRANSMISSION,
ATMOSPHERE (U)
IDENTIFIERS: *CARBON MONOXIDE LASERS, VIBRATIONAL
SPECTRA, ROTATIONAL SPECTRA, ATMOSPHERIC
ATTENUATION (U)

AN INTRACAVITY GAS CELL TECHNIQUE IS DEMONSTRATED FOR RESTRICTING THE CARBON MONOXIDE (CO) LASER OSCILLATIONS TO LINES COINCIDENT WITH THE TRANSMISSION BANDS OF THE ATMOSPHERE. USING AN INTRACAVITY WATER VAPOR CELL, THE CO LASER GAIN WAS SPOILED IN LINES THAT ARE ABSORBED BY ATMOSPHERIC WATER VAPOR, PERMITTING THE OSCILLATIONS TO BUILD UP ONLY ON THE HIGHER TRANSMISSION LINES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-734 547 20/6 20/5 4/1
OHIO STATE UNIV COLUMBUS ELECTROSCIENCE LAB

INVESTIGATION OF LASER PROPAGATION PHENOMENA. (U)

DESCRIPTIVE NOTE: INTERIM TECHNICAL REPT. 1 JAN-1 JUL 71,
AUG 71 49P COLLINS,STUART A. , JR.;
REINHARDT,G. W. ;
REPT. NO. ESL-3163-2
CONTRACT: F30602-71-C-0132, ARPA ORDER-1279
PROJ: ARPA-1E20
MONITOR: RADC TR-71-248

UNCLASSIFIED REPORT

DESCRIPTORS: (*COHERENT RADIATION, ATMOSPHERIC MOTION), LIGHT TRANSMISSION, PROPAGATION, TURBULENCE, MICROMETEOROLOGY (U)
IDENTIFIERS: LASER BEAMS (U)

THIS REPORT DEALS WITH THEORETICAL INVESTIGATIONS IN THE AREA OF LINEAR ATMOSPHERIC PROPAGATION PHENOMENA AND MICROTURBULENCE STATISTICS. IT SPECIFICALLY DEALS WITH THE EXAMINATION OF PROPER AVERAGING TIMES REQUIRED FOR PROPAGATION EXPERIMENTS AND WITH THEORETICAL BACKUP FOR PHASE STRUCTURE FUNCTION MEASUREMENTS. FINALLY, A BIBLIOGRAPHY ON OPTICAL PROPAGATION WHICH WAS PREPARED EARLIER HAS BEEN UPDATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-734 798 20/6 20/5
RCA LABS PRINCETON N J

EFFECTS OF TURBULENCE INSTABILITIES ON LASER PROPAGATION. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 9 JUN-8 SEP 71,
OCT 71 26P DE WOLF,DAVID A. ;
REPT. NO. PRRL-71-CR-31
CONTRACT: F30602-71-C-0356, ARPA ORDER-1279
PROJ: ARPA-1E20
MONITOR: RADC TR-71-249

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT TRANSMISSION, ATMOSPHERIC MOTION), (*COHERENT RADIATION, FOCUSING), TURBULENCE, OPTICAL IMAGES, DISTORTION (U)
IDENTIFIERS: *LASER BEAMS, ATMOSPHERIC ATTENUATION (U)

WHEN IMAGES ARE FORMED FROM LASER BEAMS PROPAGATING THROUGH TURBULENT AIR, A VARIETY OF SCINTILLATION PHENOMENA OCCURS: BEAM WANDER, INTENSITY FLUCTUATIONS, HOT- AND COLD-SPOT FORMATION, IMAGE BLURRING, SPOT BROADENING, ETC. THE PURPOSE OF THIS PROJECT IS TO STUDY THESE EFFECTS ANALYTICALLY, AND THUS TO INTERPRET MEASUREMENTS AND PREDICT PERFORMANCE IN FUTURE LASER SYSTEMS.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-735 935 20/6 20/5
OREGON GRADUATE CENTER BEAVERTON*

MULTIWAVELENGTH LASER PROPAGATION STUDY. (U)

DESCRIPTIVE NOTE: SEMIANNUAL REPT. JUL-DEC 71,
JAN 72 87P KERR,J. RICHARD ;
REPT. NO. 1154-13
CONTRACT: N00014-68-A-0461-0001, ARPA ORDER-1806

UNCLASSIFIED REPORT

DESCRIPTORS: (*COHERENT RADIATION, ATMOSPHERIC MOTION), (*LASERS, LIGHT TRANSMISSION), SCINTILLATION, TURBULENCE, SCATTERING, DISTRIBUTION FUNCTIONS, INFRARED RADIATION, IRASERS, LIGHT COMMUNICATION SYSTEMS (U)
IDENTIFIERS: ATMOSPHERIC SCATTERING, *LASER BEAMS (U)

DURING THE REPORTING PERIOD, PRELIMINARY EXPERIMENTS WERE CONDUCTED ON THE NATURE AND EFFECTS OF FUNDAMENTAL INTERMITTENCIES IN ATMOSPHERIC TURBULENCE. THESE INTERMITTENCIES AFFECT SCINTILLATION LEVELS, STATISTICS, AND EXPERIMENTAL DATA SPREAD, TO A MUCH GREATER DEGREE THAN HAS BEEN GENERALLY RECOGNIZED. FOLLOWING THIS, ATTENTION WAS GIVEN TO TRANSMITTER APERTURE EFFECTS, AND CURRENT EXPERIMENTS ARE POINTING OUT SERIOUS DEFICIENCIES IN CERTAIN THEORETICAL PREDICTIONS. AS AN EXAMPLE, THE CONCEPT OF A FOCUSED BEAM SEEMS LARGELY MEANINGLESS IN TURBULENCE, AND PREDICTIONS OF SHARP REDUCTIONS IN SCINTILLATIONS UNDER SUCH A CONDITION ARE NOT BORNE OUT BY PHOTOGRAPHIC AND ELECTRONIC OBSERVATIONS. FINALLY, A RECENT SERIES OF COMPREHENSIVE MULTIWAVELENGTH SCINTILLATION EXPERIMENTS WAS INCORPORATED INTO A PAPER, WITH THE ADDITION OF NEW INTERPRETATIVE MATERIAL.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-736 037 20/5 4/1
OHIO STATE UNIV COLUMBUS ELECTROSCIENCE LAB

LASER ABSORPTION IN THE 5 MICRON BAND. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL REPT. 23 JUN-20 SEP 71,
NOV 71 42P LONG,RONALD ;
REPT. NO. ESL-3271-1
CONTRACT: F30602-72-C-0015, ARPA ORDER-1279
PROJ: ARPA-0E20
MONITOR: RADC TR-71-314

UNCLASSIFIED REPORT

DESCRIPTORS: (*COHERENT RADIATION, ATMOSPHERE), ABSORPTION SPECTRUM, ATTENUATION, GAS LASERS, CARBON MONOXIDE, ATMOSPHERIC TEMPERATURE, HUMIDITY, OPTICAL PROPERTIES, EXPERIMENTAL DESIGN, TEST EQUIPMENT, IRASERS (U)
IDENTIFIERS: CARBON MONOXIDE LASERS, *ATMOSPHERIC ATTENUATION, *LASER BEAMS, INTERMEDIATE INFRARED RADIATION, COMPUTER AIDED ANALYSIS (U)

THE REPORT SUMMARIZED TECHNICAL DETAILS OF THE WORK PERFORMED FROM JUNE 23 TO SEPTEMBER 23, 1971. A DETAILED DISCUSSION OF WORK PERFORMED AT THE OHIO STATE UNIV. ELECTRO-SCIENCE LABORATORY IS PRESENTED. THIS WORK CONSISTED OF ATMOSPHERIC TRANSMITTANCE CALCULATIONS NEAR 5 MICROMETER AND THE DESIGN OF A LABORATORY EXPERIMENT TO DETERMINE THE TRANSMITTANCE OF CO LASER RADIATION THROUGH SYNTHETIC ATMOSPHERES. COMPUTER PROGRAMS HAVE BEEN WRITTEN TO CALCULATE THE MOLECULAR ABSOPTION DUE TO ATMOSPHERIC ABSORBERS NEAR 5MICROMETER. THE TYPE OF CALCULATIONS INCLUDE COMPUTER PLOTS OF THE CALCULATED SPECTRA, MORE ACCURATE TRANSMITTANCE VALUES AT THE FREQUENCIES OF THE CO LASER EMISSIONS FOR HORIZONTAL PATHS, AND TRANSMITTANCE VALUES AT THE FREQUENCIES OF THE CO LASER EMISSIONS FOR SLANT PATHS THROUGH THE ATMOSPHERE. PRELIMINARY CALCULATIONS ARE PRESENTED WITH WATER VAPOR AS THE ONLY ATMOSPHERIC ABSORBER CONSIDERED. THE DESIGN OF AN EXPERIMENT TO MEASURE THE TRANSMITTANCE OF THE CO LASER EMISSIONS THROUGH SIMULATED ATMOSPHERES IS DESCRIBED. SPECIFIC TOPICS COVERED ARE THE CO LASER, SELECTION OF THE EMISSION LINES TO BE MEASURED, THE MULTIPLE TRAVERSAL CELL, AND THE EXPERIMENTAL PROCEDURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-736 282 20/6 4/1
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

MULTIPLE-SCATTERING MODEL FOR LIGHT TRANSMISSION THROUGH OPTICALLY THICK CLOUDS. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,
JAN 71 9P HEGGESTAD,HAROLD M. ;
REPT. NO. JA-3860
CONTRACT: F19628-70-C-0230
MONITOR: ESD TR-71-313

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OPTICAL SOCIETY OF AMERICA, V61 N10 P1293-1300 OCT 71.

DESCRIPTORS: (*LIGHT TRANSMISSION, *CLOUDS), SCATTERING, MATHEMATICAL MODELS, LIGHT COMMUNICATION SYSTEMS, DISTRIBUTION FUNCTIONS (U)
IDENTIFIERS: DIGITAL SIMULATION (U)

A LINEAR-SYSTEM MODEL HAS BEEN DEVELOPED TO PREDICT IRRADIANCE DISTRIBUTIONS OF VISIBLE LIGHT BELOW AN IDEALIZED OPTICALLY THICK ATMOSPHERIC CLOUD, WHICH IS ILLUMINATED FROM ABOVE IN AN ARBITRARY MANNER. THE MODEL OFFERS ELEGANT MATHEMATICAL SIMPLICITY AT THE EXPENSE OF SOME PRECISION. AS SUCH, IT IS APPLICABLE TO A BROAD CLASS OF PROBLEMS IN WHICH CORRECT FUNCTIONAL FORMS ARE REQUIRED, BUT LEVELS OF ACCURACY BETTER THAN A FACTOR OF 2 ARE NOT NECESSARY. OPTICAL THICKNESSES CAN RANGE FROM ABOUT 5 TO 32. ONE EXAMPLE OF A PROBLEM IN THIS CLASS, THE DESIGN OF A LASER COMMUNICATION SYSTEM TO OPERATE THROUGH CLOUDS, PROVIDED THE ORIGINAL MOTIVATION FOR DEVELOPMENT OF THE LIGHT-TRANSMISSION MODEL. THE OPTICAL EFFECTS OF THE CLOUD ARE CALCULATED BY MEANS OF A FOUR-DIMENSIONAL LINEAR SUPERPOSITION INTEGRAL, WHICH TAKES ACCOUNT OF MULTIPLE SCATTERING. TWO ILLUSTRATIONS OF THE METHOD ARE GIVEN IN DETAIL, WITH INCIDENT ILLUMINATION REPRESENTED BY A TIGHTLY COLLIMATED BEAM AND BY A SUM OF INFINITE PLANE WAVES, RESPECTIVELY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-736 316 20/5 4/1
GEORGETOWN UNIV WASHINGTON D C DEPT OF PHYSICS

ATMOSPHERIC DEPOLARIZATION AND STIMULATED BRILLOUIN SCATTERING. (U)

MAY 71 5P JORNA,SIEBE ;
CONTRACT: F44620-68-C-0017
PROJ: AF-7921
MONITOR: AFOSR TR-72-0247

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN APPLIED OPTICS, V10 N12 P2661-2664 DEC 61.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH CALIFORNIA, SAN DIEGO, LA JOLLA. INST. FOR PURE AND APPLIED PHYSICAL SCIENCES.

DESCRIPTORS: (*COHERENT RADIATION, ATMOSPHERE), LIGHT TRANSMISSION, POLARIZATION, SCATTERING, LIGHT COMMUNICATION SYSTEMS (U)
IDENTIFIERS: *LASER BEAMS, ATMOSPHERIC SCATTERING, *BRILLOUIN SCATTERING (U)

THE EFFECT OF ELECTROSTRICTIVELY INDUCED STIMULATED BRILLOUIN SCATTERING ON ATMOSPHERIC DEPOLARIZATION IS STUDIED. SOLUTIONS FOR STEADY-STATE AND TRANSIENT CONDITIONS ARE OBTAINED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-736 354 17/2
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

VARIABLE-RATE OPTICAL COMMUNICATION THROUGH THE TURBULENT ATMOSPHERE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 71 102P LEVITT,BARRY K. ;
REPT. NO. TR-483
CONTRACT: DA-28-043-AMC-02536(E), NGL-22-009-013
PROJ: DA-2-0-061102-B-31-F

UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, *IONOSPHERIC PROPAGATION), TURBULENCE, LASERS, SIGNAL-TO-NOISE RATIO, RAYLEIGH SCATTERING, ATTENUATION, MATHEMATICAL MODELS (U)
IDENTIFIERS: ATMOSPHERIC ATTENUATION (U)

THE PERFORMANCE OF OPTICAL COMMUNICATION LINKS OVER ATMOSPHERIC CHANNELS IS SEVERELY LIMITED BECAUSE OF THE EFFECTS OF TURBULENCE. ONE METHOD OF RECOVERING SOME OF THE ATMOSPHERIC FADING LOSSES IS TO MATCH THE INSTANTANEOUS SIGNALLING RATE TO THE CHANNEL STATE. THE AUTHORS DEMONSTRATE THAT THE DATA TRANSMITTER CAN EXTRACT REAL-TIME CHANNEL-STATE INFORMATION BY PROCESSING THE FIELD RECEIVED WHEN A PILOT TONE IS SENT FROM THE DATA RECEIVER TO THE DATA TRANSMITTER. BASED ON THESE CHANNEL MEASUREMENTS, THE AUTHORS DERIVE OPTIMAL VARIABLE-RATE TECHNIQUES, AND SHOW THAT SIGNIFICANT IMPROVEMENTS IN SYSTEM PERFORMANCE ARE OBTAINED, PARTICULARLY AT LOW BIT ERROR RATES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZLW13

AD-737 535 20/5
INFORMATICS TISCO INC RIVERDALE MD

BIBLIOGRAPHY OF SOVIET LASER DEVELOPMENTS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. NO. 5, JUL-SEP 71, DEC 71 95P HIBBEN, STUART G.
CONTRACT: F44620-70-C-0081, ARPA ORDER-1622
PROJ: ARPA-0F10
MONITOR: AFOSR TR-72-0485

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO INTERIM REPT. NO. 4, AD-732 244.

DESCRIPTORS: (*LASERS, USSR), (*BIBLIOGRAPHIES, LASERS), GAS LASERS, IRASERS, SEMICONDUCTORS, OPTICAL MATERIALS, OPTICAL EQUIPMENT COMPONENTS, COHERENT RADIATION, RADIATION EFFECTS, LIGHT COMMUNICATION SYSTEMS, DATA PROCESSING SYSTEMS, STEREOSCOPIC PHOTOGRAPHY, RADIATION DAMAGE, PLASMA GENERATORS (U)
IDENTIFIERS: SOLID STATE LASERS, SEMICONDUCTOR LASERS, LIQUID LASERS, CHEMICAL LASERS, ULTRAVIOLET LASERS, NONLINEAR OPTICS, ORGANIC DYE LASERS, LASER MATERIALS, QUANTUM ELECTRONICS, HOLOGRAPHY (U)

THE REPORT COVERS THE THIRD QUARTER OF 1971 WITH THE MAJOR YIELD OF INFORMATION COMING FROM THE APPROXIMATELY 30 PERIODICALS KNOWN TO REPORT THE MOST ADVANCED AND INTERESTING FINDINGS IN SOVIET LASER TECHNOLOGY. THIS AS WELL AS THE PREVIOUS FOUR REPORTS COVERS THE FOLLOWING TOPICS: (1) LASER RESEARCH -- SOLID STATE, LIQUID, GAS AND CHEMICAL LASERS; UV; COMPONENTS; NONLINEAR OPTICS; SPECTROSCOPY OF LASER MATERIALS; SHORT PULSE GENERATION; CRYSTAL GROWING; AND GENERAL THEORY; (2) LASER APPLICATIONS -- BIOLOGICAL EFFECTS, COMMUNICATIONS, COMPUTER TECHNOLOGY, HOLOGRAPHY, INSTRUMENTATION, MATERIALS PROCESSING, AND PLASMA GENERATION. (AUTHOR) (U)

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SYLVANIA ELECTRONIC SYSTEMS-EAST WALTHAM MASS APPLIED RESEARCH LAB

ACQUISITION AND TRACKING LASER COMMUNICATIONS SYSTEM. (U)

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UNCLASSIFIED REPORT

DESCRIPTORS: (*LIGHT COMMUNICATION SYSTEMS, GAS LASERS), DESIGN, MODEL TESTS, TARGET ACQUISITION, OPTICAL TRACKING, MIRRORS, REFLECTION, SWEEP GENERATORS, RANGES(DISTANCE), ATMOSPHERIC REFRACTION, ACCURACY, INSTRUCTION MANUALS, WIRING DIAGRAMS, HELIUM, NEON, TELEPHOTO LENSES, FOCUSING, CONTROL SYSTEMS, TRACKING TELESCOPES, ELECTROOPTICS, PHOTOMULTIPLIERS (U)
IDENTIFIERS: LASER COMMUNICATION SYSTEMS, BEAM-STEERING, BREADBOARD MODELS, APERTURES (U)

THREE DIFFERENT TECHNIQUES FOR AN ACQUISITION AND TRACKING COMMUNICATIONS SYSTEM WERE EVALUATED, AND A DESIGN PLAN WAS MADE FOR THE MOST PROMISING APPROACH. IN ADDITION, A SERIES OF ATMOSPHERIC PROPAGATION EXPERIMENTS WERE PERFORMED OVER A 1-KILOMETER TURBULENT ATMOSPHERIC PATH TO DETERMINE OPTIMUM BEAMWIDTHS AND RECEIVING APERTURE SIZES. FURTHERMORE, STUDIES OF AN ELECTRO-MAGNETICALLY OPERATED BEAM-STEERING MIRROR WERE MADE. IN THE RECOMMENDED SYSTEM A MUTUALLY ALIGNED LASER TRANSMITTER AND RECEIVER COMBINATION USING A COMMON MIRROR STEERING ELEMENT IS USED TO ALWAYS POINT BOTH RECEIVER AND TRANSMITTER ALONG THE SAME DIRECTION IN SPACE. THE FOCAL PLANE OF THE OPTICS IS SCANNED TO ACQUIRE AND SUBSEQUENTLY TRACK THE REFLECTED SIGNAL FROM A RETROREFLECTOR MOUNTED ON THE REMOTE TERMINAL. THE AUTOMATIC ACQUISITION AND SEARCH PHASE IS ACCOMPLISHED BY MOVING THE MIRROR BEAM-STEERING ELEMENT IN A RASTER SCAN. THE AUTOMATIC TRACKING FUNCTION IS PERFORMED BY ELECTRONICALLY SCANNING THE FOCAL PLANE OF THE OPTICS WITH AN IMAGE DISSECTOR (U)

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F AD-603 622

*AF30 602 2619
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BURLINGTON MASS
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F AD-605 319

*AF30 602 3122
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F AD-612 725

*AF 30(602)-3346
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(RADC-TR-66-704-VOL-1)
F AD-650 870
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F AD-650 871
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F AD-650 872

*AF 33(615)-1254
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*AF33 615 1265
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*AF 33(615)-3868
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*AF 33(615)-5248
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*AF33 616 7081
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*AF33 616 8392
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*AF33 657 8619
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*AF33 657 8995
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*AF 33(657)-11144
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*AF 49(638)-1607
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F AD-722 475

*AF AFOSR2 63
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RCA LABS PRINCETON N J
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(RADC-TR-71-249)
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*F30602-72-C-0016
OHIO STATE UNIV COLUMBUS
ELECTROSCIENCE LAB
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*N00014-72-C-0043
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*NGL-22-009-013
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